GEK-25373A

WORKMASTER™

PROGRAMMABLE
CONTROL
INFORMATION
CENTER

Guide to Operation

GENERAL ELECTRIC

Warning, Caution, And Notes As Used In This Publication

WARNING

Warning notices are used where equipment might be damaged if care is not taken.

In situations where inattention could cause either personal injury or damage to equipment, a Caution notice is used.

CAUTION

Caution notices are used in this publication to emphasize that hazardous voltages, currents, and temperatures that could cause personal injury exist in this equipment.

NOTE

Notes merely call attention to information that is especially significant in understanding and operating the equipment.

Second Edition (September 1984)

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Preface

The *Guide to Operation* provides you with the necessary information to install and operate the Workmaster™. The manual also describes how to diagnose and correct any problems that may occur.

This manual is organized as follows:

Chapter 1. Introduction: This chapter gives a general description of the Workmaster. The chapter consists of line drawings of the system components and short definitions of each component.

Chapter 2. Installation: This chapter presents a checklist of the setup procedures. Each item on the checklist is described in detail. Instructions tell how to set up the Workmaster, including checking switch positions and monitoring the power-on self-test. The chapter contains setup instructions to the point of attaching the Workmaster to the Series Six.

Chapter 3. Problem Determination Procedures: This chapter provides step-by-step instructions for identifying problems that may occur. The diagnostic procedures in this chapter are also included in the *Advanced Diagnostics* manual. The Diagnostics diskette is included at the back of the *Guide to Operation*.

Chapter 4. Option Installation: This chapter describes the Workmaster hardware. The chapter also includes installation procedures for Workmaster options.

Chapter 5. Relocation: This chapter specifies procedures for repacking and transporting the Workmaster.

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RELATED PUBLICATIONS

Advanced Diagnostics, GEK-25374

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CHAPTER 1
INTRODUCTION

The Workmaster™ is a portable computer that can be used in an industrial environment to communicate with General Electric Programmable Controllers. The Workmaster consists of the following:

- A built-in, 9-inch display
- One 3-1/2-inch diskette drive
- One sealed keyboard.

The Workmaster may have an optional second diskette drive and an optional 83-key keyboard. The system unit is in a protective enclosure with a handle for carrying.

The Workmaster contains a Combination Adapter card that includes the following:

- Printer port
- Asynchronous communications port
- Thermal warning switch interface
- Keylock switch interface
- Real-time clock with battery backup.

WARNING

The Combination Adapter card in the Workmaster contains a battery. Do not put the battery in fire or mutilate it because it may burst or release toxic material. Do not short circuit the battery because it may cause burns. Do not ingest or handle the contents of the battery.

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WORKMASTER FEATURES

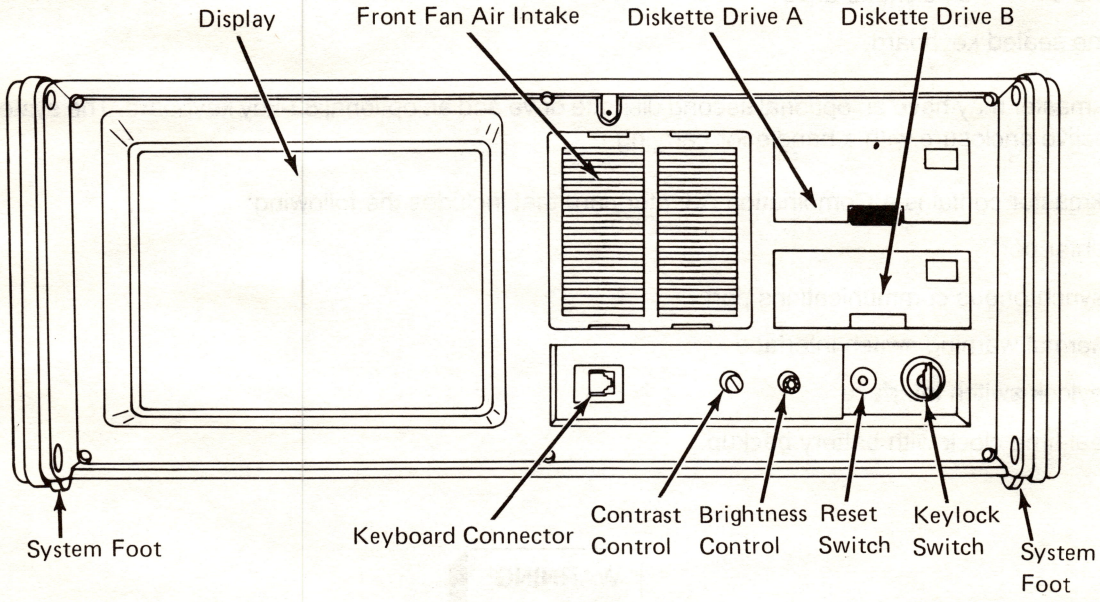
To become familiar with the system, study the following figures.

NOTE

The Workmaster system unit and keyboard are shipped in separate boxes. Make sure you have both boxes before you begin setting up the system.

SYSTEM UNIT

Front View with Keyboard Removed

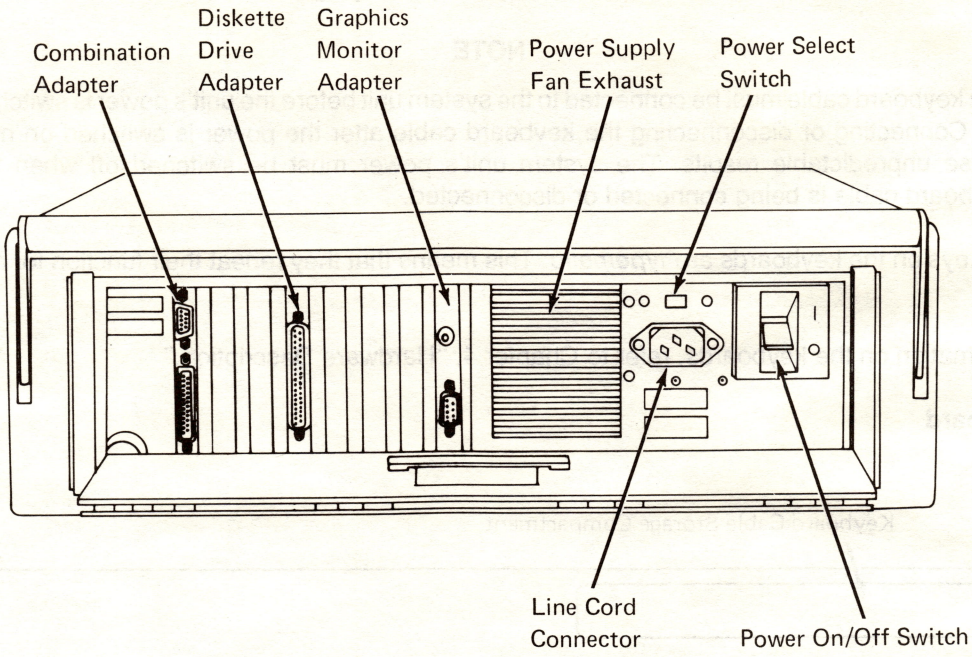


The system feet shown above tilt the system unit for a better viewing angle of the display screen. To tilt the system unit, pull each foot toward the front of the system unit. The foot will snap into position. To replace the feet in stored position, push the feet back to the stored position.

NOTE

The Reset switch shown above causes the Workmaster to reset the entire system, run a power-on self-test, and reload the diskette (if a diskette is inserted). Any programs running when the Reset switch is pressed are cancelled.

Rear View


Combination Adapter
Diskette Drive Adapter
Graphics Monitor Adapter
Power Supply Fan Exhaust
Power Select Switch
Line Cord Connector
Power On/Off Switch

KEYBOARDS

Two keyboards are available for Workmaster. Refer to the following figures.

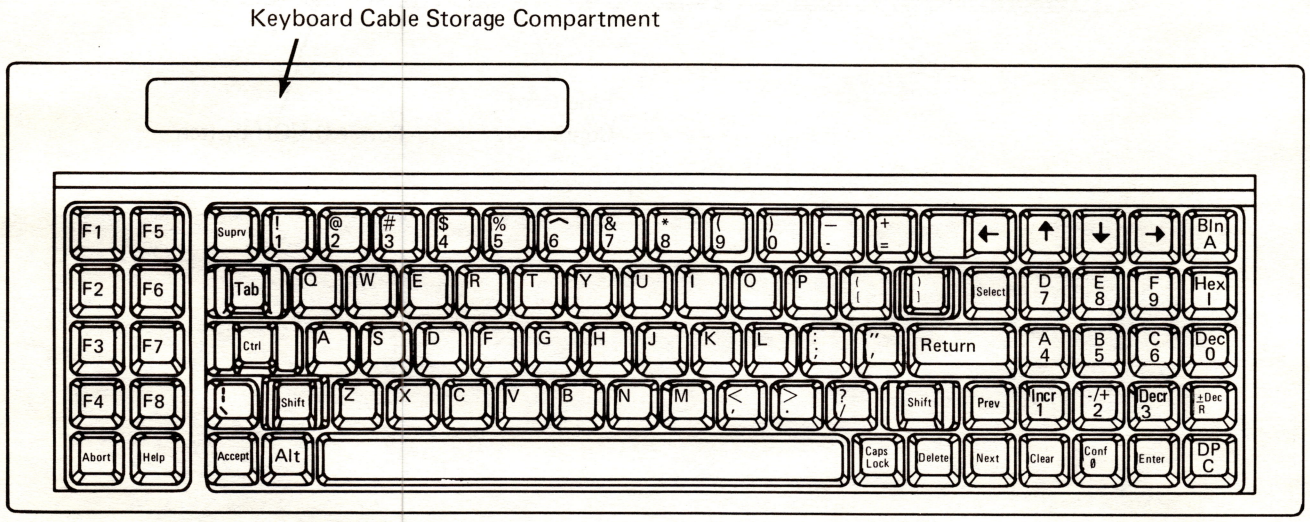
NOTE

The keyboard cable must be connected to the system unit before the unit's power is switched on. Connecting or disconnecting the keyboard cable after the power is switched on may cause unpredictable results. The system unit's power must be switched off when the keyboard cable is being connected or disconnected.

All typewriter keys on the keyboards are *typematic*. This means that they repeat their function for as long as you press them.

For more information on the keyboards, refer to Chapter 4, "Hardware Description."

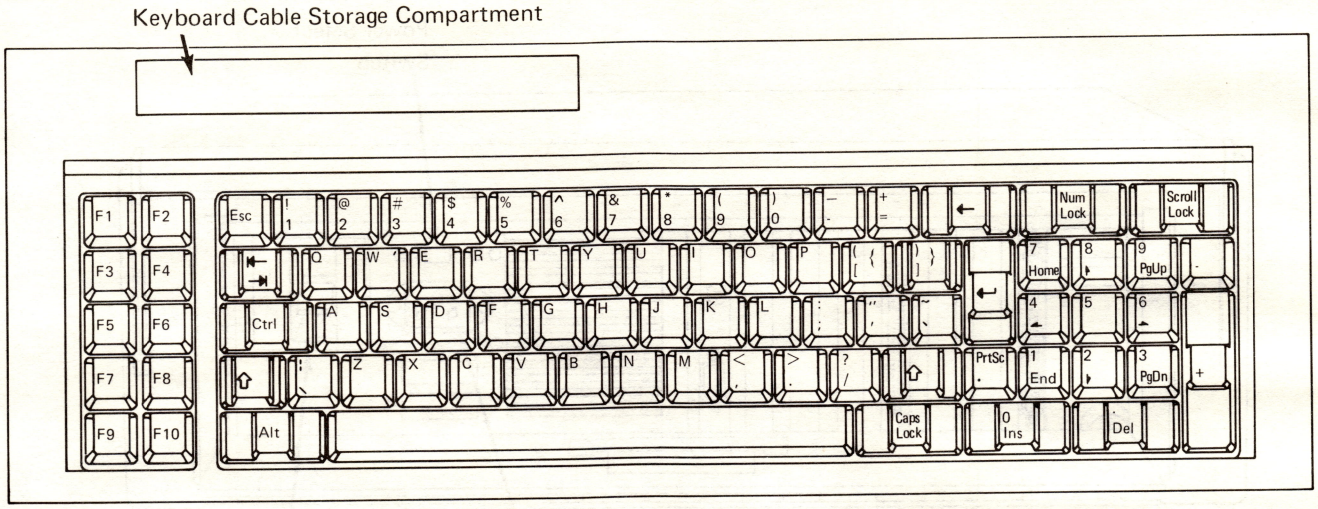
91-Key Keyboard



The keyboard connects to the Workmaster with a 122 centimeter (48-inch) coiled cable. A storage compartment for the cable is built in to the keyboard assembly. The cable should be stored in the compartment when the keyboard is in the closed position. Refer to "Keyboard" in Chapter 2 of this manual. The keyboard attaches to the front of the system unit to form part of the enclosure.

The 91-key keyboard can operate in two modes: as a 91-character keyboard, and as an 83-character keyboard. For more information, refer to "91-Key Keyboard Test" under "Test 300-KEYBOARD" in Chapter 3.

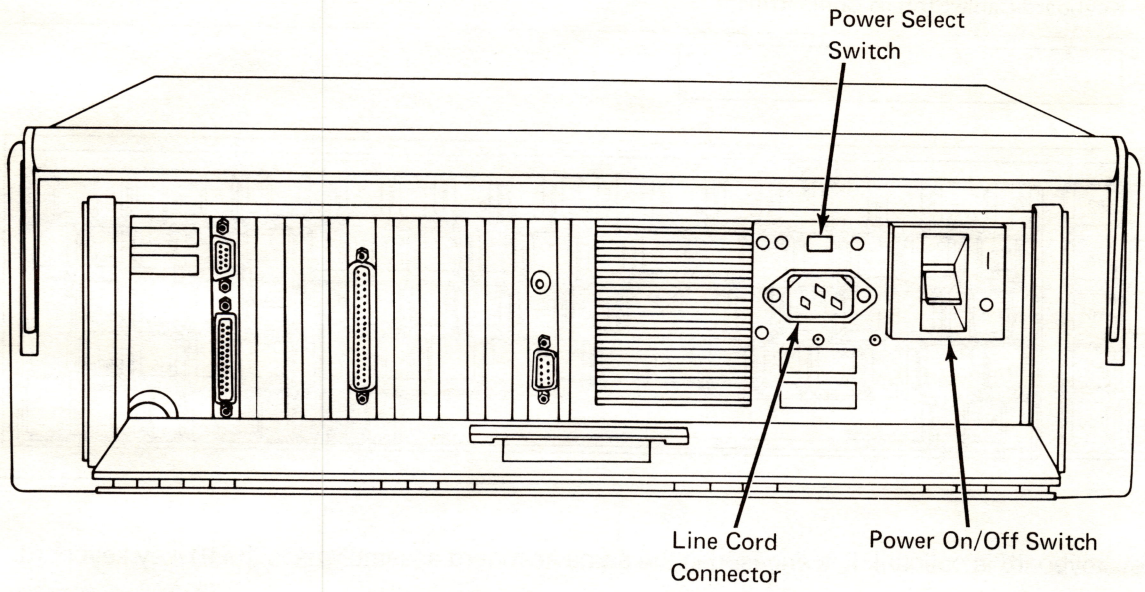
83-Key Keyboard



The 83-key keyboard is optional. It is encased in the same keyboard assembly as is the 91-key keyboard.

The 83-key keyboard also connects to the Workmaster with a 122 centimeter (48-inch) coiled cable. A storage compartment for the cable is built in to the keyboard assembly. The cable should be stored in the compartment when the keyboard is in the closed position. The keyboard attaches to the front of the system unit to form part of the enclosure.

POWER SUPPLY



The power supply can be set to either 115 Vac (volts ac) or 230 Vac. A 115V line cord is shipped with the Workmaster.

NOTE

The 115 Vac and the 230 Vac settings are for reference only. The 115 Vac setting selects input voltages in the 110 to 120 Vac range. The 230 Vac setting selects input voltages in the 208 to 240 Vac range.

The power supply can operate at 50 or 60 Hz input frequency.

COMBINATION ADAPTER CARD

The Combination Adapter Card combines several functions. The functions are:

- Printer Port
- Asynchronous Communications Port
- Thermal Warning Switch
- Keylock Switch
- Real-time Clock.

Keylock Switch

The keylock switch is in the system. The combination adapter card supports the keylock switch by providing an access to the keylock switch for GE supplied software.

Real-time Clock

The real-time clock is backed up by a rechargeable battery. A fully charged battery will back up the clock for 180 days at 20°C. Due to storage and temperature considerations, the battery may not be fully charged, and will require the Workmaster to be operational for a minimum of seven hours per week. If the Workmaster is operational for more than seven hours per week, the battery charge will increase to its maximum capacity.

The real-time clock must be set and read through the software.

OVERALL OPERATING CHARACTERISTICS

- **POWER SUPPLY**

  Maximum Operating Voltage:

90V Min.	137V Max	115V Switch Setting
180V Min.	259V Max	230V Switch Setting

  Maximum Input Current: 3.5 Amps at 90 VAC

  Input Frequency Range: 47 to 63 Hertz

- **TEMPERATURE**

  Operating Limits: 0°C to 50°C

  Non-Operating Limits: −20°C to 60°C

- **HUMIDITY**

  Operational and Non-Operational: 10% to 95% (non-condensing)

- **VIBRATION**

  Operating Limits: 5 to 10 Hz at .2'' peak to peak displacement
  10 Hz to 200 Hz at 1G peak to peak

  Non-Operating Limits: 5 to 10 Hz at .4'' peak to peak displacement
  10 Hz to 200 Hz at 2G's peak to peak

- **SHOCK**

  Operating Limits: 5G's at 10 msec (½ sine wave)

  Non-Operating Limits: 15G's at 10 msec (½ sine wave)

- **ALTITUDE**

  Operating Limit: 7,000 feet (2134m)

  Non-Operating Limit: 15,000 feet (4572m) unpressurized
  44,000 feet (13411m) unpressurized for a period of no longer than 6 hours and no more than 10 times per year

- **AVAILABLE POWER:***

+5	15 Watts	−12	1.4 Watts
+12	15 Watts	−5	1.5 Watts

- **OPTION SLOTS AVAILABLE:***

  Short - 1
  Long - 3

- **OPERATING ORIENTATION**

  Horizontal (Normal desktop orientation)
  Vertical (Later with special stand)

*Configured with 1 graphics board, 1 disk drive control, 1 combo card, 1 384K RAM board.

CHAPTER 2
INSTALLATION

This chapter tells you how to install the Workmaster™. Read all of the instructions before attempting to begin installing the system. Follow each step carefully to ensure successful installation.

INVENTORY CHECKLIST

The Workmaster system unit and keyboard are shipped in separate boxes. Make sure you have all the contents of each box before you begin setting up the system.

The system unit box contains the following:

- System unit and two keys
- *Guide to Operation* manual
- Power cord
- Allen wrench for removing front Bezel.

The keyboard box contains the keyboard. Any options that you have ordered will be shipped in separate boxes.

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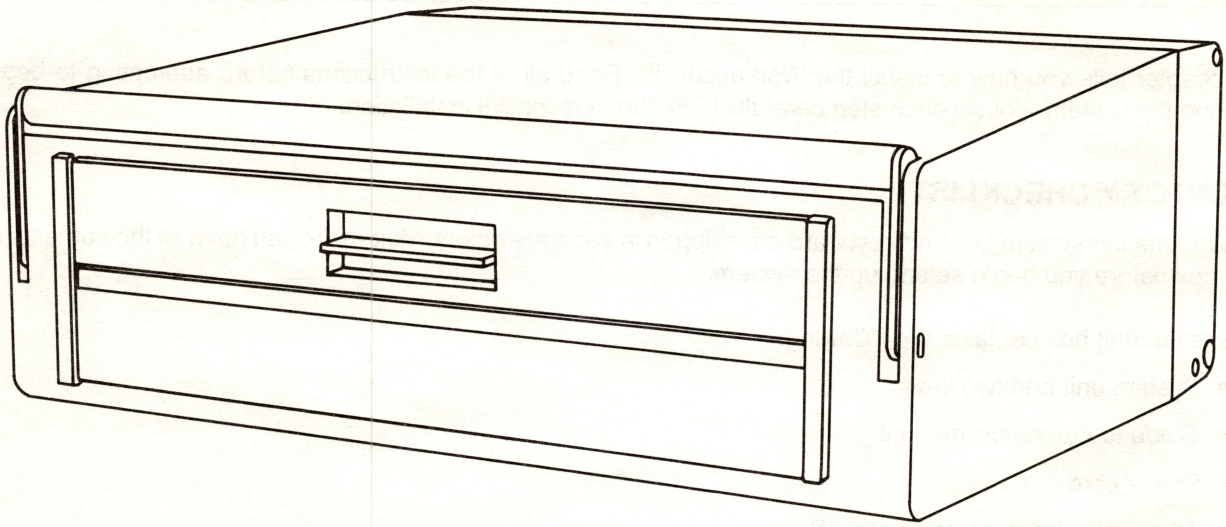
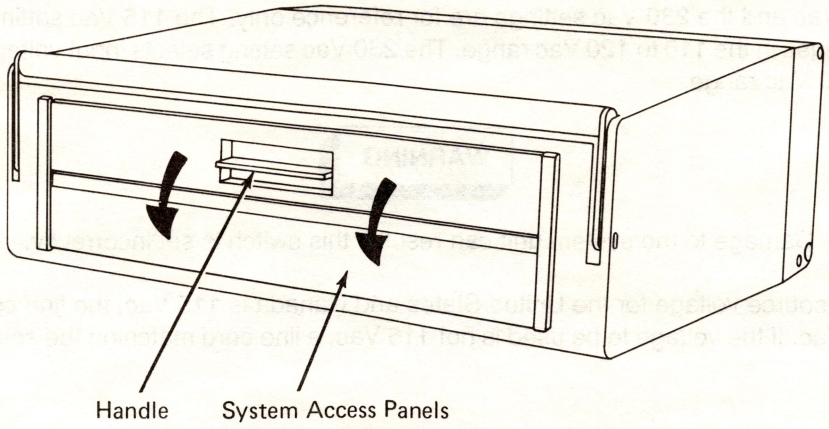
SYSTEM SETUP

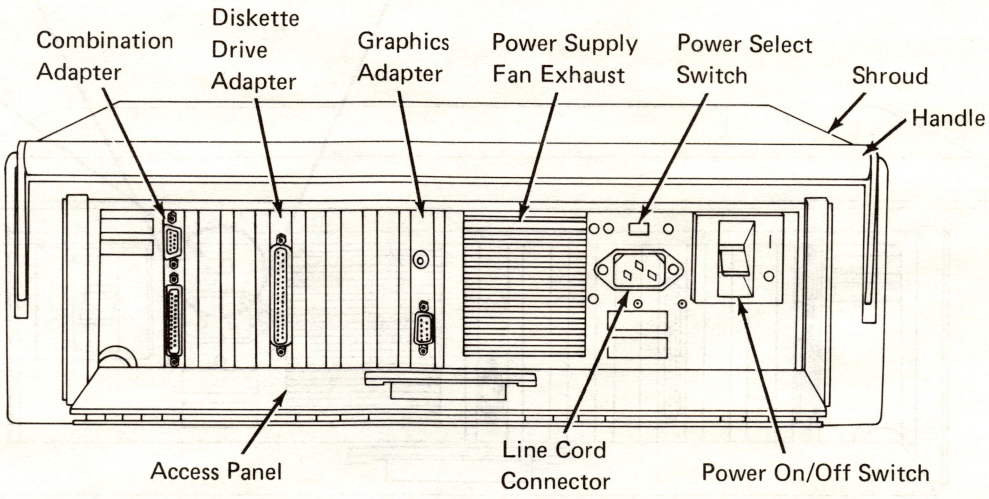
1. If you have not already done so, remove the keyboard, system unit, and power cord from the shipping cartons.
2. Place the system unit on a table. Refer to the following figure:



3. Open the access panels at the rear of the system unit by pulling the handle in the center of the top panel. Refer to the following figure:



4. Look at the following figure and become familiar with the features at the rear of the system unit.



5. Workmaster operates on a power source of either 115 Vac or 230 Vac. The input-voltage selector switch must be set to match the voltage available at the Workmaster's location.

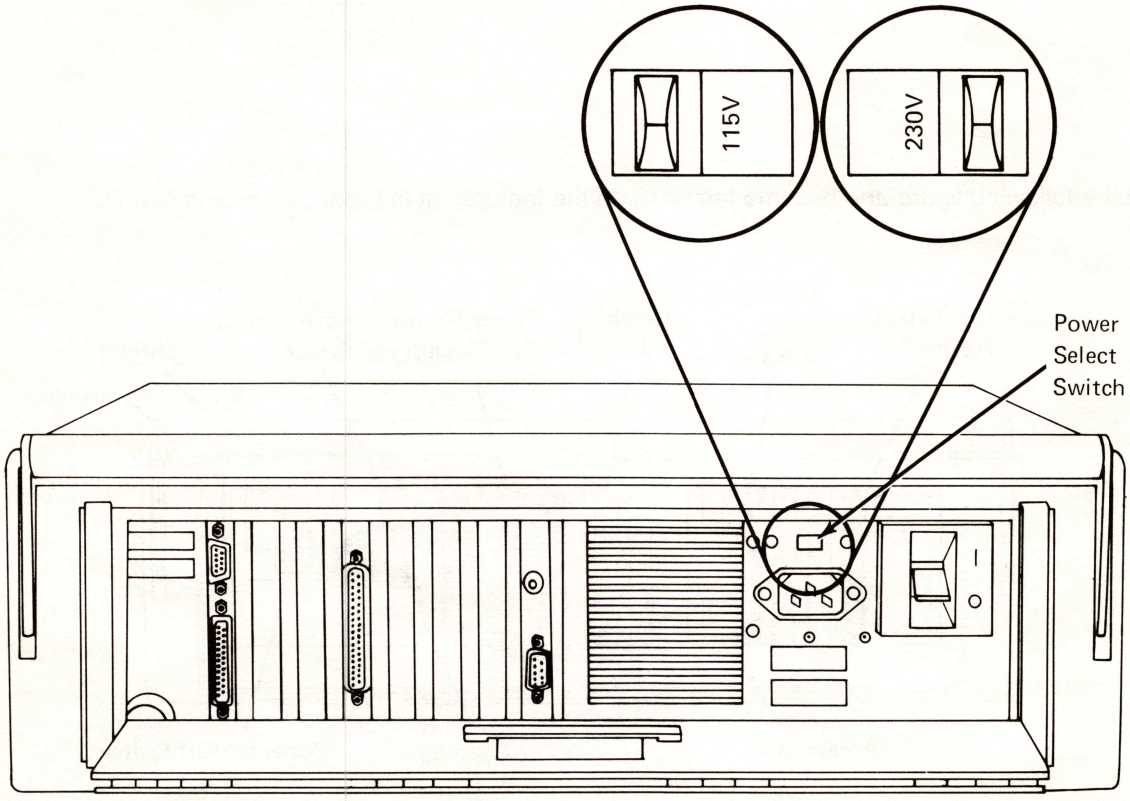
NOTE

The 115 Vac and the 230 Vac settings are for reference only. The 115 Vac setting selects input voltages in the 110 to 120 Vac range. The 230 Vac setting selects input voltages in the 208 to 240 Vac range.

WARNING

Damage to the system unit can result if this switch is set incorrectly.

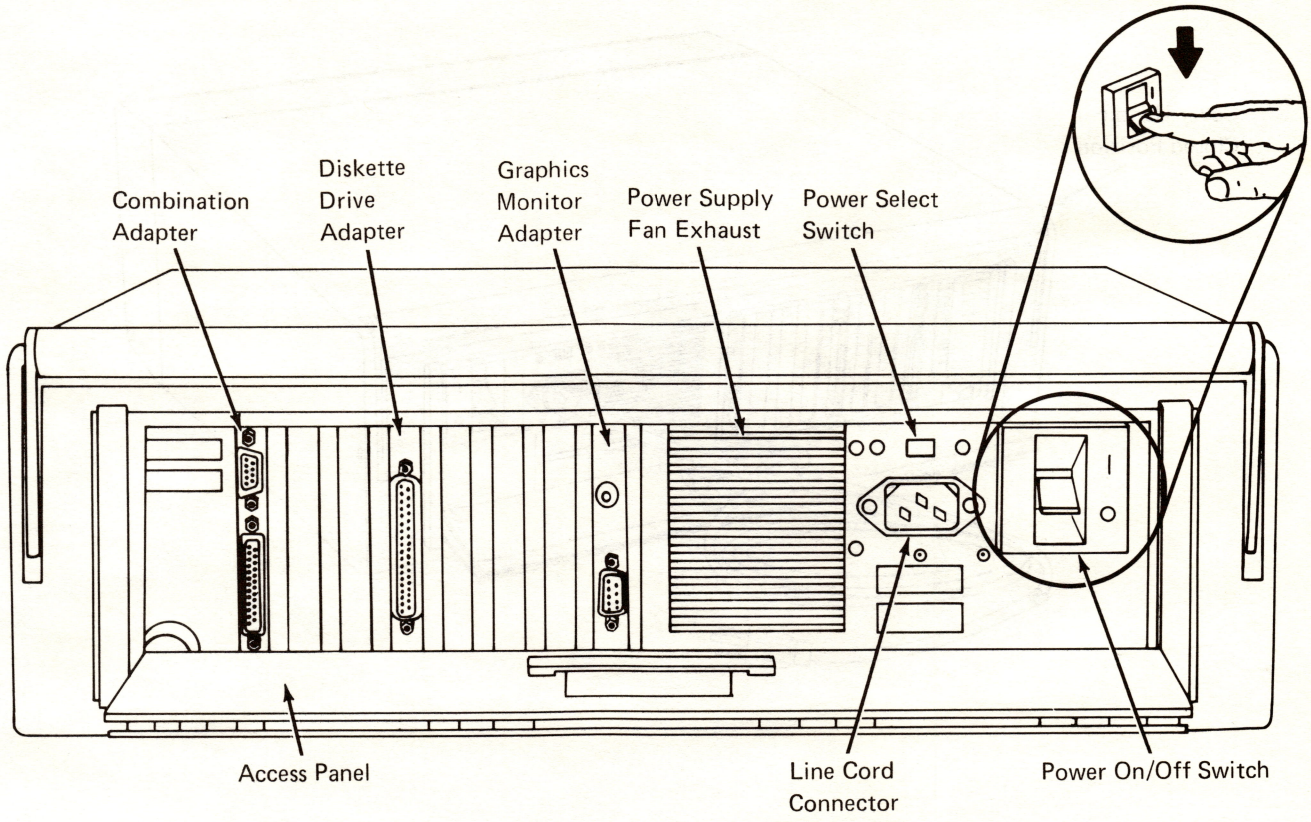
Because the normal source voltage for the United States and Canada is 115 Vac, the line cord shipped with the Workmaster is 115 Vac. If the voltage to be used is not 115 Vac, a line cord matching the source voltage must be obtained.



6. Set the system unit's Power switch to Off.

   I This is the international symbol for On.

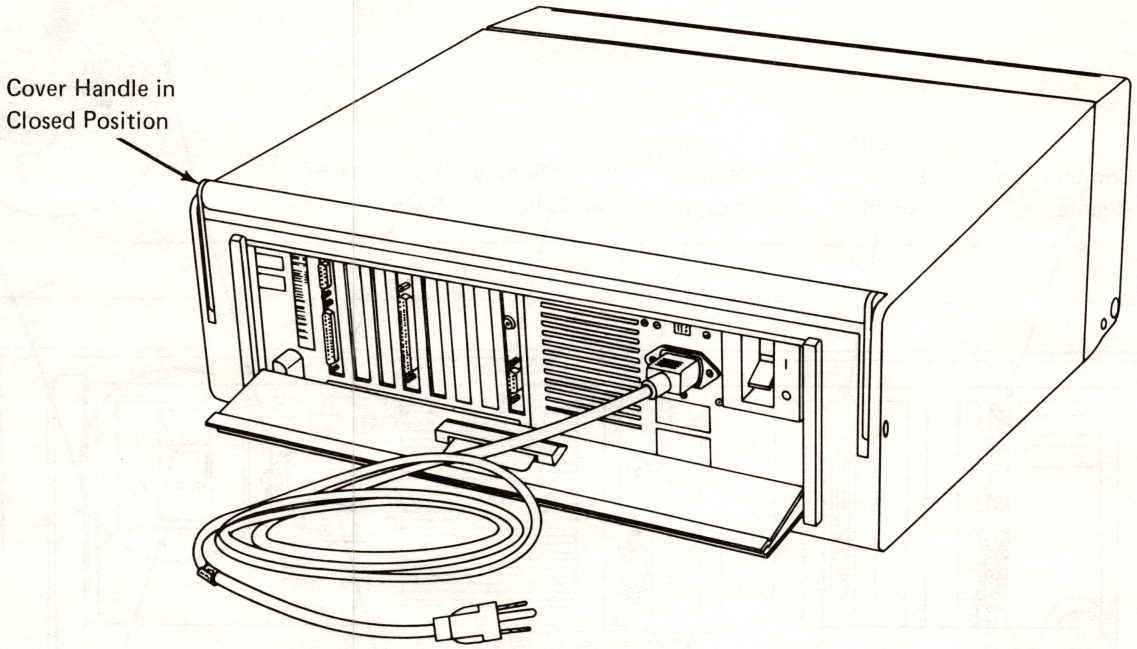
   O This is the international symbol for Off.



7. Connect the power cord to the system unit.

NOTE

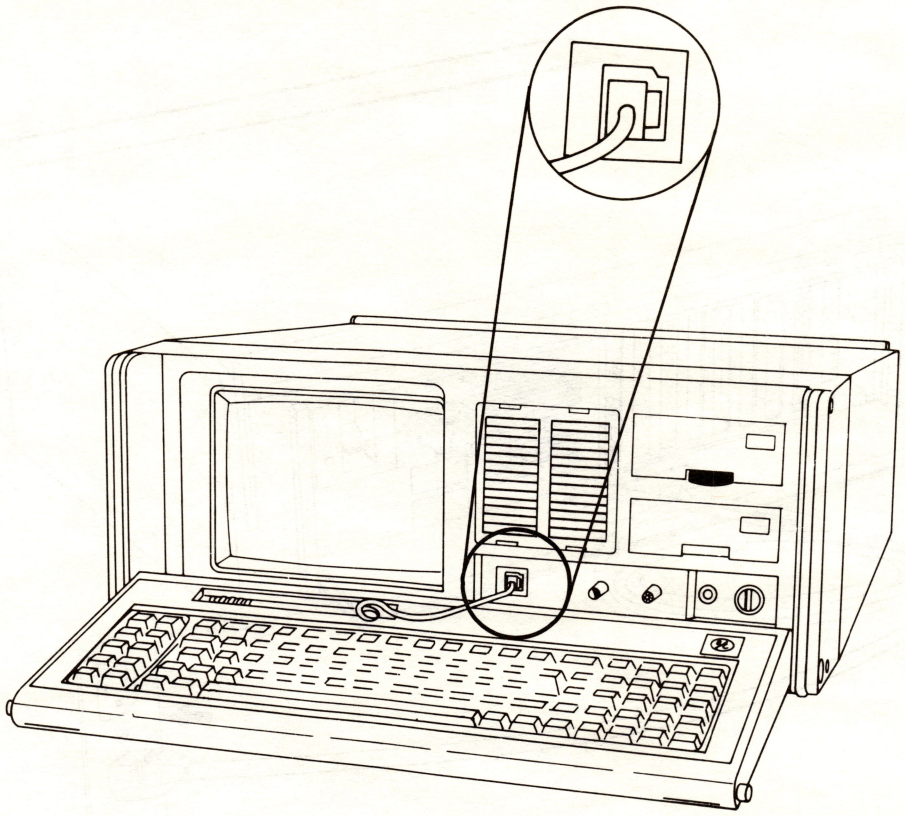
Make sure the cover handle is in the closed position as shown below.



8. Face the front of the system unit. Connect the keyboard cable to its connector. Refer to the following figure.

NOTE

The keyboard cable must be connected to the system unit before the unit's power is switched on. Connecting or disconnecting the keyboard cable after the power is switched on may cause unpredictable results. The system unit's power must be switched off when the keyboard cable is being connected or disconnected.

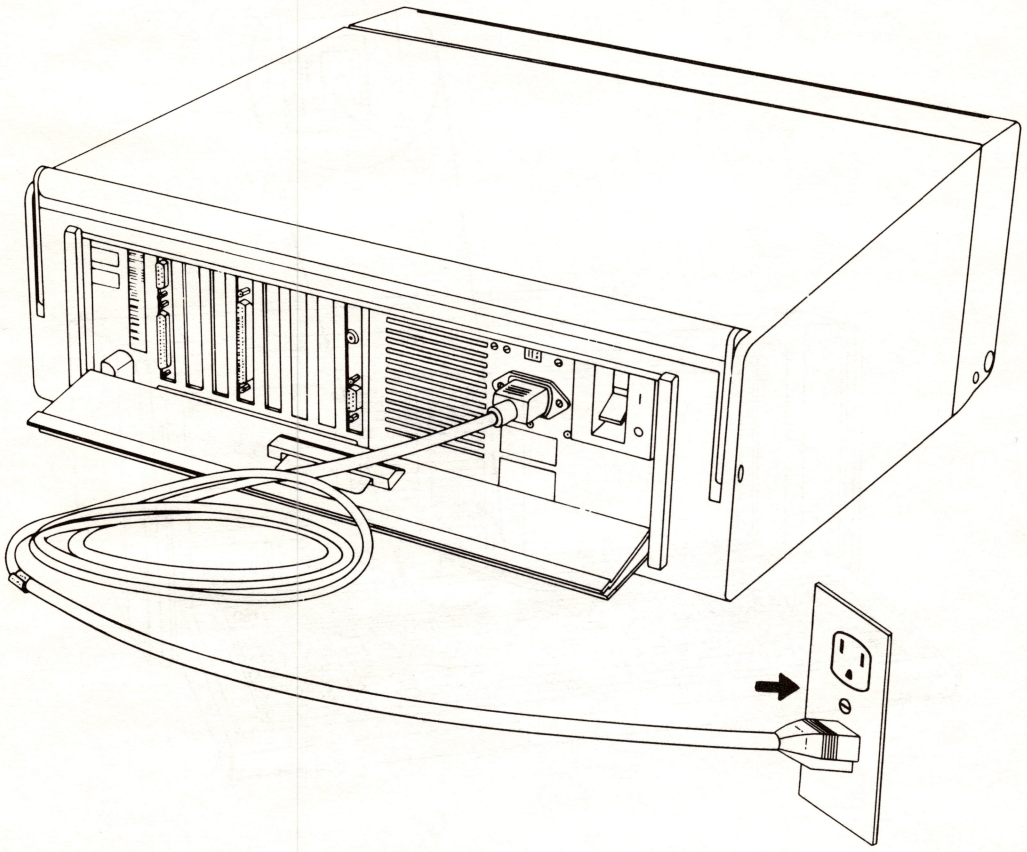


To attach the keyboard to the system unit, refer to "Keyboard" in this chapter.

9. Plug the power cord into the wall outlet.

CAUTION

This product is equipped with a line cord and plug designed for the user's safety. It is to be used with a properly grounded receptacle to avoid possible electrical shock or damage to the Workmaster.



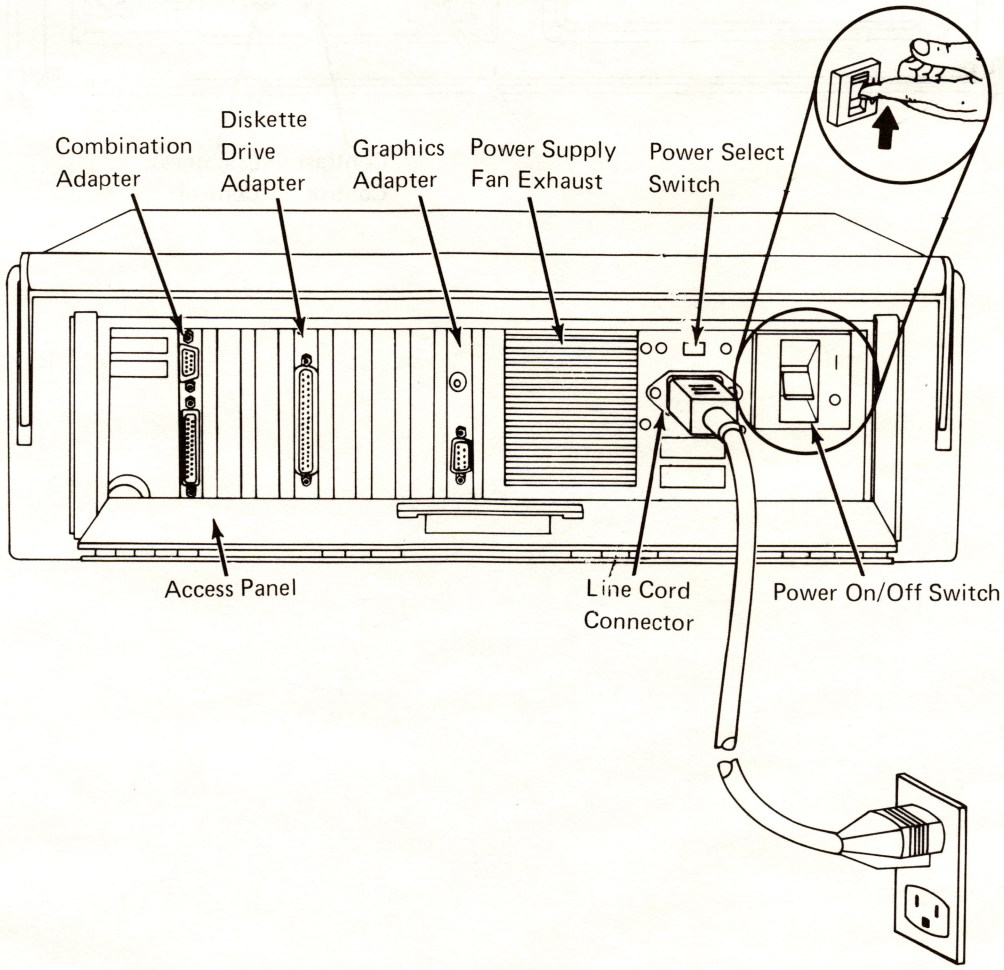
POWER-ON SELF-TEST

The power-on self-test will run after you switch on the system unit. The self-test takes 23 to 90 seconds, depending on the amount of memory installed in the system.

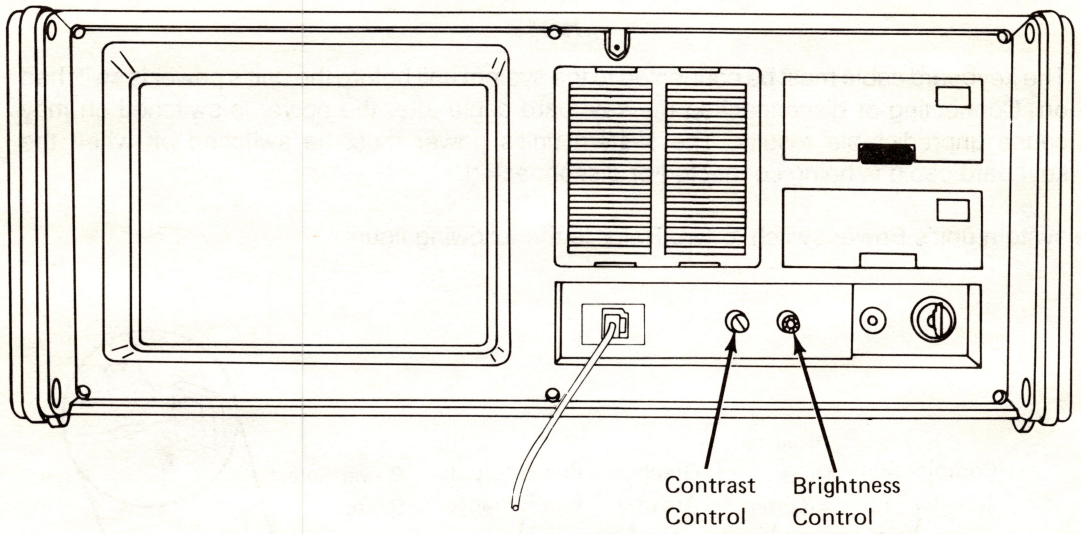
NOTE

The keyboard cable must be connected to the system unit before the unit's power is switched on. Connecting or disconnecting the keyboard cable after the power is switched on may cause unpredictable results. The system unit's power must be switched off when the keyboard cable is being connected or disconnected.

1. Set the system unit's Power switch to On. Refer to the following figure:



2. Turn the display's contrast and brightness controls fully clockwise. Refer to the following figure. After the first screen is displayed, adjust the controls for eye comfort.



NORMAL SELF-TEST RESPONSES

There are normally three responses:

1. An indication of the memory test will appear in the upper-left corner of the screen. The number should continue to increase until it equals the amount of memory installed in the system. For example, a system with 256KB of memory shows the following:

   256 KB OK

2. You should hear one short beep when the self-test has finished running.
3. The IBM Personal Computer BASIC screen appears with a blinking cursor (if a program diskette is not loaded).

NOTE

X can be any character.

The IBM Personal Computer Basic
Version CXXX Copyright IBM Corp.XXXX
XXXXX Bytes free
Ok
—

1LIST 2RUN 3LOAD" 4SAVE" 5CONT 6LPT1 7TRON 8TROFF 9KEY 0SCREEN

NOTE

During the power-on self-test, the diskette drive's in-use light blinks for about 8 seconds. If the diskette drive is malfunctioning, the in-use light does not blink.

If you received the correct responses, the Workmaster has successfully completed the power-on self-test. If the responses are not correct, go to Chapter 3, "Problem Determination Procedures," and follow the instructions.

KEYBOARD

The keyboard can be used either attached to or detached from the front panel.

NOTE

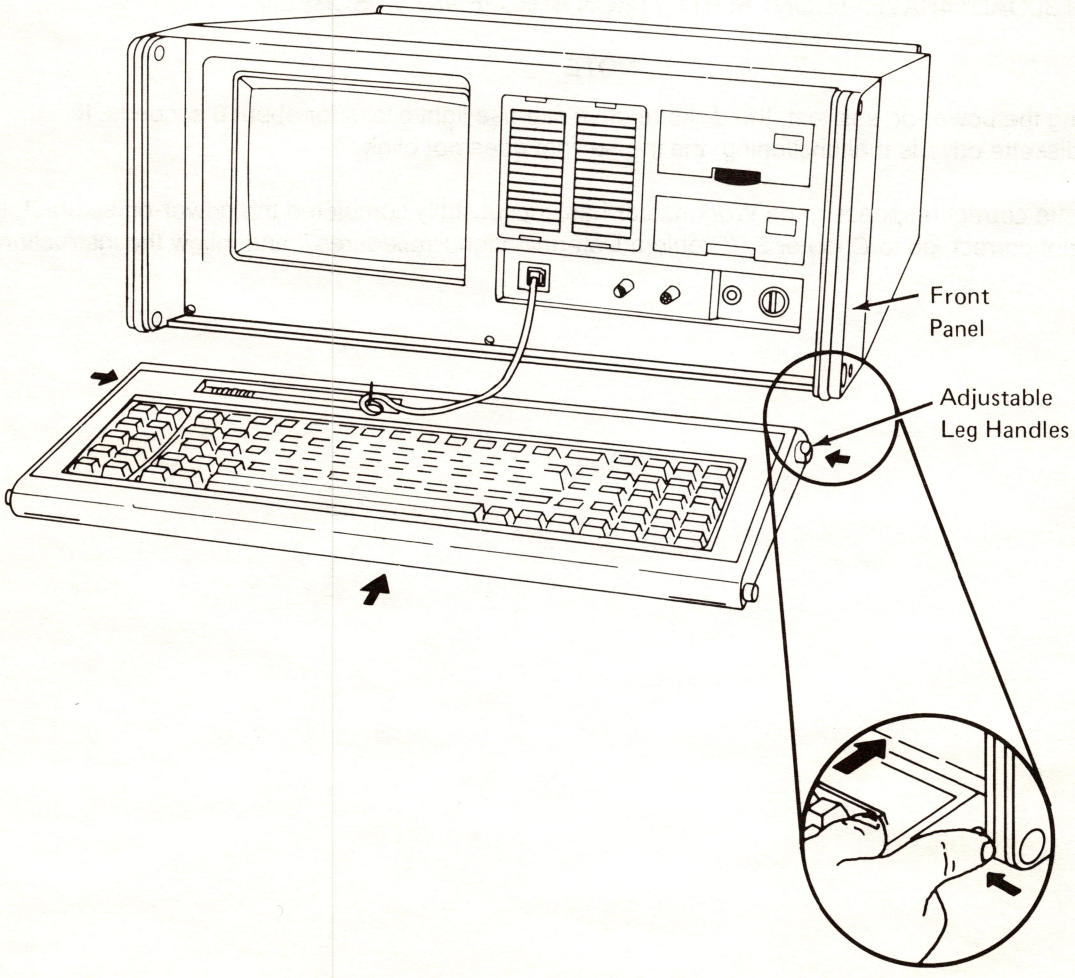
The keyboard cable must be connected to the system unit before the unit's power is switched on. Connecting or disconnecting the keyboard cable after the power is switched on may cause unpredictable results. The system unit's power must be switched off when the keyboard cable is being connected or disconnected.

ATTACHING THE KEYBOARD TO THE SYSTEM UNIT

To attach the keyboard to the front panel, press the adjustable leg handles in, and slide them into the bottom holes on the system unit's front panel.

NOTE

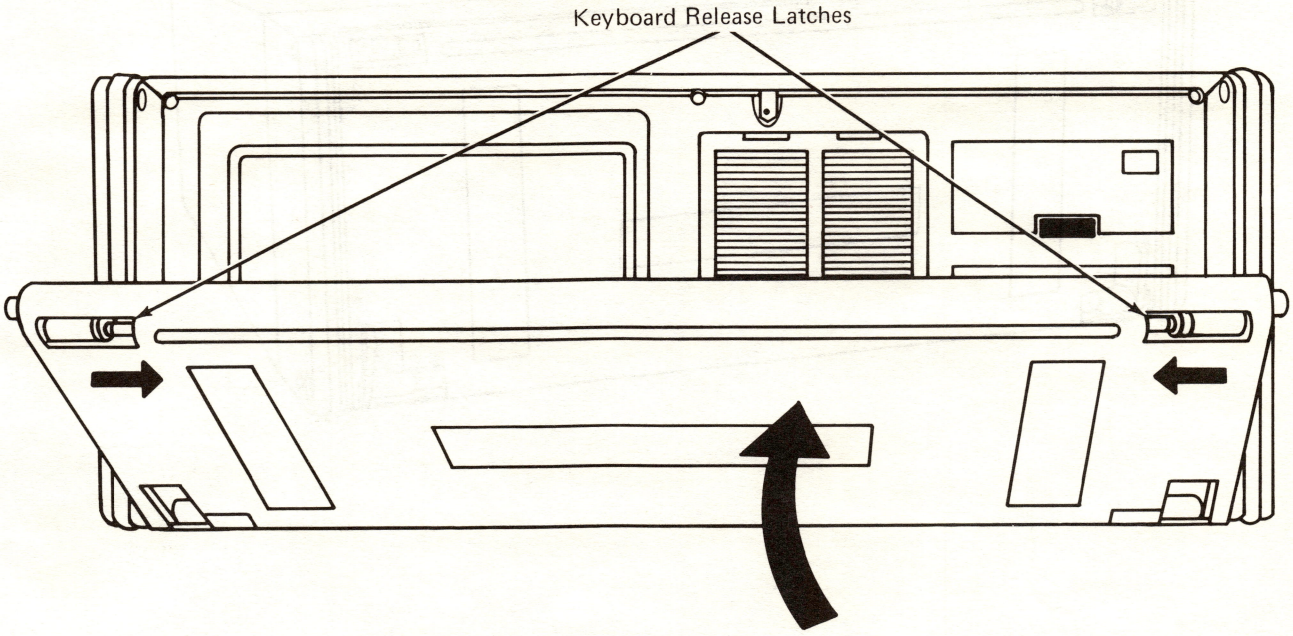
To prevent damage to the keyboard, only the inserted key should be present when you close the keyboard.



CLOSING THE KEYBOARD

When the keyboard is attached to the front panel, it may be placed in the closed position.

1. Put the keyboard cable in its storage compartment.
2. Pivot the keyboard up.
3. Press the two keyboard release latches in while pushing the keyboard against the front panel. Be careful second key is not interferring with closure. Refer to the arrows in the figure below:

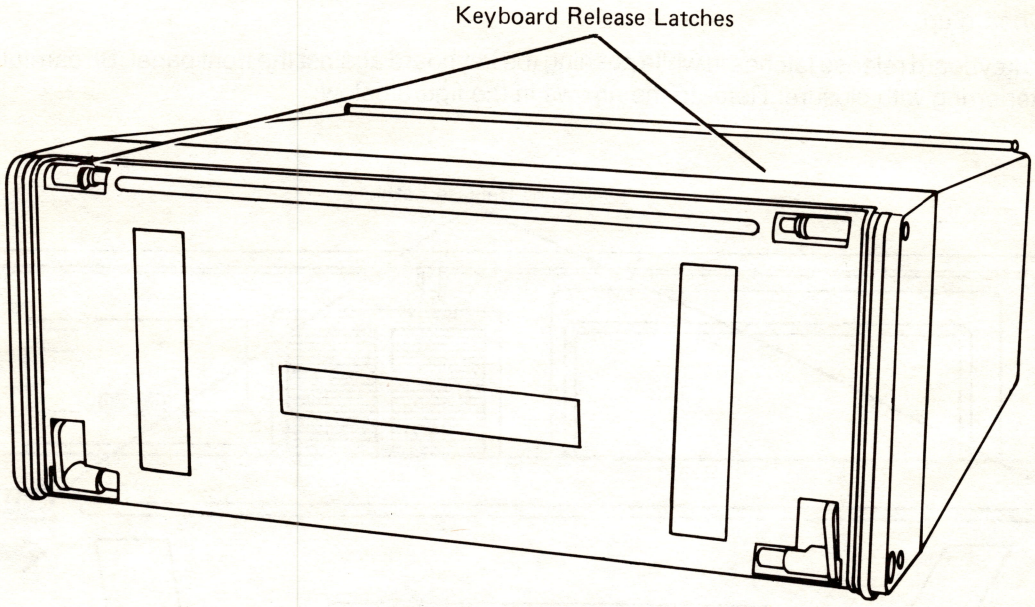


4. Release the latches.

When carrying the Workmaster, the keyboard should be in the closed position. For more information on carrying the system unit, refer to Chapter 5, "Relocation."

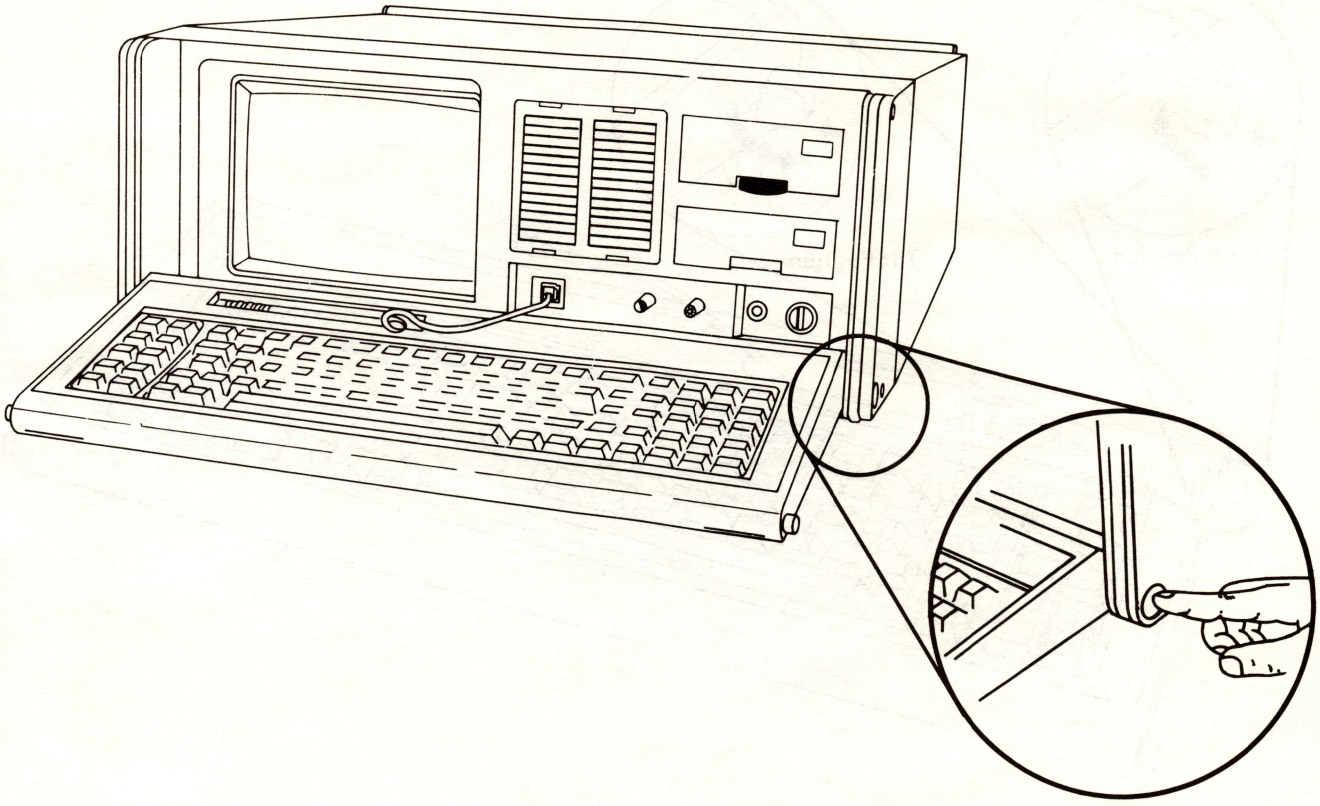
LOWERING THE KEYBOARD

To lower the keyboard to the operating position, press the two keyboard release latches in and lower the keyboard.



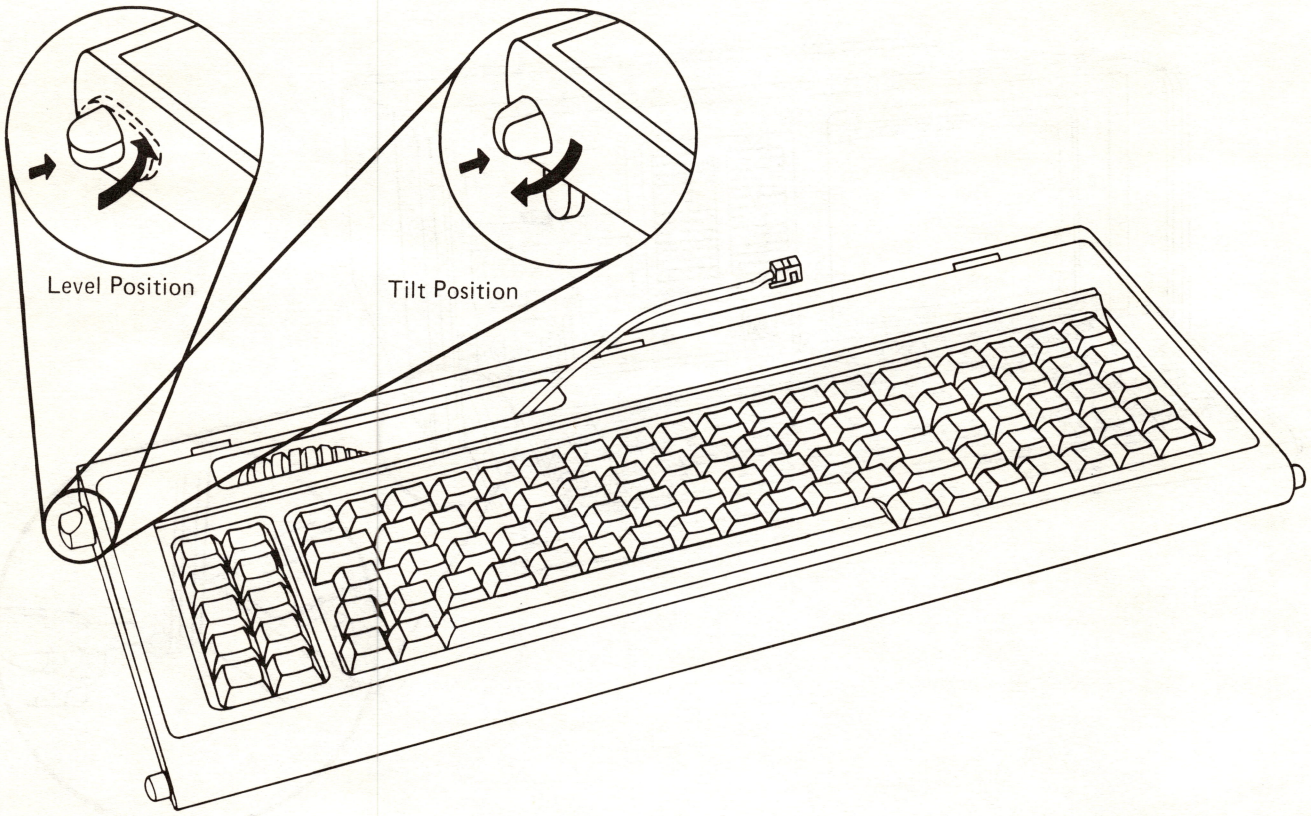
DETACHING THE KEYBOARD FROM THE SYSTEM UNIT

Workmaster is designed so that you can detach the keyboard from the front panel for typing comfort. To detach the keyboard from the front panel, pull the keyboard cable out of its storage compartment, and push in on the adjustable leg handles by putting a finger in each of the front panel's bottom holes. Pull the keyboard away from the front panel.



TILTING THE KEYBOARD FOR TYPING COMFORT

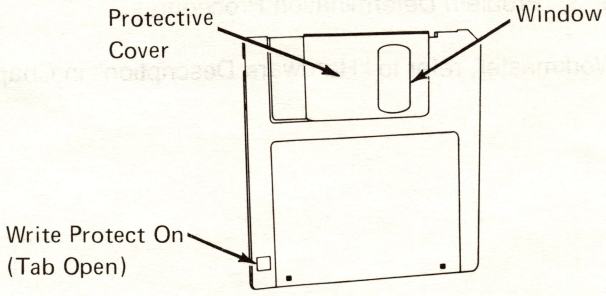
The keyboard has two positions for typing comfort when it is detached from the front panel. Firmly push in the adjustable leg handles and turn them to the desired position.



HANDLING DISKETTES

To maintain diskettes, you should handle them carefully. To avoid damaging diskettes, handle them as directed.

Refer to the following figure of a 3½ inch diskette.



- Do not touch the exposed media under the protective cover.
- Do not leave the diskette in the sun.
- Do not expose the diskette to excessive temperatures.
- Do not expose the diskette to magnets.
- Do not clean the diskette.

OPTION INSTALLATION

If you have a second diskette drive to install, install it at this time. Refer to "Installing the Optional Second Diskette Drive" under "Installing Options" in Chapter 4.

SUMMARY

You have now set up the Workmaster. You have learned how to perform the power-on self-test and recognize the responses that occur during a successful power-on self-test. You have learned how to attach and detach the keyboard from the system unit, and how to tilt the keyboard for typing comfort. You learned the proper way of handling diskettes to protect them from damage. Now you are ready to run the system through a complete diagnostic test procedure. If you had any errors during the power-on self-test, you should perform a complete system checkout. Go to Chapter 3, "Problem Determination Procedures."

For further information on the Workmaster, refer to "Hardware Description" in Chapter 4, "Option Installation."

CHAPTER 3
PROBLEM DETERMINATION PROCEDURES

The procedures in this chapter guide you through a complete system checkout. By following the step-by-step instructions and answering yes or no to questions asked, you can determine whether or not your system is operating correctly. If a problem is detected, you will be guided in taking corrective action, or you will be told which unit needs to be serviced.

WARNING

Some of the problem determination procedures require you to switch off the Workmaster™ and disconnect it from all external devices. Be aware of the equipment that depends on Workmaster before disconnecting external devices. Take necessary precautions before switching off the power.

The procedures direct the use of two diagnostic tools:

- The power-on self-test is a diagnostic program; it is an integral part of the system and is executed every time power is turned on.
- The basic and advanced diagnostics are menu-controlled sets of diagnostic programs contained on diskettes. The diskette also supports the format function required by the advanced diagnostics.

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This chapter consists of the following sections:

- Checking Electrical Connections
- Power-On Self-Test
- Diskette Format Procedure
- Diagnostic Testing
- Test 100-SYSTEM BOARD
- Test 200-256KB MEMORY
- Test 300-KEYBOARD
- Test 500-GRAPHICS MONITOR ADAPTER
- Test 600-1 DISKETTE DRIVE(S) AND ADAPTER
- Test 700-MATH COPROCESSOR
- Test 900-PRINTER ADAPTER
- Test 1100-ASYNC COMMUNICATIONS ADAPTER
- Test 4700-CLOCK ADAPTER.

Perform these procedures in sequence and as directed to accomplish a system checkout.

NOTE

The keyboard cable must be connected to the system unit before the unit's power is switched on. Connecting or disconnecting the keyboard cable after the power is switched on may cause unpredictable results. The system unit's power must be switched off when the keyboard cable is being connected or disconnected.

CHECKING ELECTRICAL CONNECTIONS

1. Set the system unit's Power switch to Off.
   - I is the international symbol for On.
   - O is the international symbol for Off.
2. Unplug the system unit's power cord from the wall outlet.
3. Disconnect cables to any external devices.
4. Check the wall outlet by using a volt meter or by plugging in a working lamp or other device.
5. Disconnect and connect each cable on the system unit to ensure correct electrical connection.
6. Ensure that the power selector switch on the back of the system unit is set to the correct voltage.
7. Plug the system unit's power cord into the wall outlet.
8. Go to the next procedure, "Power-On Self-Test."

POWER-ON SELF-TEST

The power-on self-test runs each time the system-unit power is switched on.

The self-test checks the operation of the:

- System board
- Memory
- Internal display
- Keyboard
- Diskette drive.

To perform the power-on self-test, do the following:

1. Set the system unit's Power switch to On.
2. Turn the brightness and contrast controls fully clockwise, and then adjust them to the desired brightness and contrast.

During the power-on self-test:

- The diskette in-use light flashes for about 8 seconds shortly after power is switched on.
- While the system-unit memory is being tested, the memory size appears in the upper-left corner of the screen and increases in 16K-byte increments. The cursor blinks under the first number and continues to blink until the total system-unit memory has been tested.

After the power-on self-test: A short beep sounds when the power-on self-test ends successfully. The IBM Personal Computer BASIC screen appears if a program diskette is not loaded in the diskette drive.

If the power-on self-test detects an error:

- The screen is blank or the screen is not correct
- The audio response is incorrect (no beep or more than one beep)
- You receive error messages, such as:

  —601

  —XXXXX XX201 (X is any alphanumeric character.)

  —

  Or even a combination like:
  30000 00 201
  601

If, during the power-on self-test, an error message appears on the screen, the next line displayed is:

ERROR (RESUME = "F1" Key)

Or:

1801
XXX KB OK
ERROR (RESUME = "F1" KEY
—

If you press the F1 key, the system bypasses the error and attempts to complete the power-on self-test. Depending on the error, the system may or may not complete the self-test.

Errors may be indicated during or at the completion of the power-on self-test. If an error is indicated, note both the displayed messages and the audio response. Then, consult the table below:

Screen response	Audio response	Action
Amount of memory shown is wrong or no cursor appears	1 short beep	Have the system unit serviced.
XX 301 XXX KB ERROR. (RESUME=F1 KEY)	2 short beeps	Ensure that your keyboard is connected to the system unit. If it is, have the keyboard serviced.
Any error other than XX301 followed by ERROR. (RESUME=F1 KEY)	2 short beeps	Go to "Diskette Format Procedure" in this chapter.
Blank screen or anything may be displayed	No response or any response other than one short beep	Ensure that the input voltage selector switch on the back of the system unit is set correctly. If it is, have the system unit serviced.
Diskette in-use light does not flash	Not applicable	Have the diskette drive serviced.

DISKETTE FORMAT PROCEDURE

During the tests that follow, you will need a *formatted* diskette. A formatted diskette is a diskette that does not contain useful information. If you already have a formatted diskette, skip this section and proceed to "Diagnostic Testing."

NOTE

Formatting a diskette will erase any information on the diskette.

1. Set the system unit's Power switch to Off.
2. Insert the diagnostic diskette in drive A.
3. Set the system unit's Power switch to On.
4. Did the following appear on your screen? (X can be any character.)

XXX KB OK
XXXX
ERROR (RESUME = "F1" KEY)

YES Press the F1 key; then, go to the next step.

NO Go to the next step.

5. Did the following appear on your screen?

Workmaster
DIAGNOSTICS
Version 1.00(C) Copyright IBM Corp 1981, 1983

SELECT AN OPTION

0—RUN DIAGNOSTIC ROUTINES
1—FORMAT DISKETTE
2—COPY DISKETTE
3—PREPARE SYSTEM FOR RELOCATION
9—EXIT TO SYSTEM DISKETTE

ENTER THE ACTION DESIRED
? —

YES Go to the next step.

NO Remove the diskette and verify the following:

- The Diagnostics diskette was loaded
- The diskette was inserted correctly.

If a back-up Diagnostics diskette is available, repeat the procedure using the backup diskette.

If the Diagnostics diskette was inserted correctly, have the system unit serviced.

If the diskette was not correct or correctly inserted, repeat this procedure, beginning with Step 1.

6. Press 1 to select FORMAT DISKETTE; then press Enter.

NOTE

If you are using a 91-key keyboard, you may press either Enter or Return to enter data. If you are using an 83-key keyboard, you must press the New Line key (<-') to enter data. Refer to "83-Key Keyboard" in Chapter 4 for more information.

Diskettes formatted with the Diagnostic diskette will only be formatted to 40 tracks. Diskettes formatted in this manner should be used for Diagnostic purposes only. SEE GEK-25379 for procedure to format 80 tracks/side.

7. Did the following appear on your screen?

WHICH DRIVE CONTAINS THE DISKETTE
TO BE FORMATTED?

YES Press A to indicate drive A; then press Enter and go to the next step.

NO Have your system unit serviced.

8. Did the following appear on your screen?

```
WHICH DRIVE CONTAINS THE DISKETTE
TO BE FORMATTED? A
INSERT DISKETTE TO BE FORMATTED, THEN HIT ENTER.
? —
```

YES Remove the Diagnostic diskette from drive A; insert the diskette to be formatted. Press Enter to start the formatting. When the diskette drive's in-use light goes out, remove the formatted diskette. Go to the next step.

NO Have your system unit serviced.

9. Did the following appear on your screen?

```
SELECT AN OPTION

0—RUN DIAGNOSTIC ROUTINES
1—FORMAT DISKETTE
2—COPY DISKETTE
3—PREPARE SYSTEM FOR RELOCATION
9—EXIT TO SYSTEM DISKETTE

ENTER THE ACTION DESIRED
? —
```

YES Continue with "Diagnostic Testing."

NO Repeat the diskette-format procedure, substituting another diskette to be formatted and a back-up Diagnostics diskette if available. If the problem still exists, have the system unit serviced.

DIAGNOSTIC TESTING

NOTE

If a power interrupt occurs while the diagnostic tests are running, you must restart the diagnostics. Return to "Diagnostic Testing" and follow the directions. If you do not follow this procedure, unpredictable results may occur.

1. Set the system unit's Power switch to Off.
2. Insert the Diagnostics diskette in diskette drive A.
3. Set the system unit's Power switch to On.
4. After the power-on self-test has run, does your screen match the example shown below?

```
Workmaster
DIAGNOSTICS
Version 1.00 (C) Copyright IBM Corp 1981, 1983

SELECT AN OPTION

0—RUN DIAGNOSTIC ROUTINES
1—FORMAT DISKETTE
2—COPY DISKETTE
3—PREPARE SYSTEM FOR RELOCATION
9—EXIT TO SYSTEM DISKETTE

ENTER THE ACTION DESIRED
? —
```

YES Go to the next step.

NO Remove the diskette and verify the following:

- The Diagnostics diskette was loaded.
- The diskette was inserted correctly.

If a back-up Diagnostics diskette is available, repeat the procedure, using the backup diskette.

If the Diagnostic diskette was inserted correctly, have the system unit serviced.

5. Press 0; then press Enter to select RUN DIAGNOSTIC ROUTINES.

6. Does your display match the screen shown below?

NOTE

This menu may vary depending upon the additional devices attached to Workmaster.

```
THE INSTALLED DEVICES ARE

 1-S SYSTEM BOARD
 2-S 256KB MEMORY
 3-S KEYBOARD
 5-S GRAPHICS MONITOR ADAPTER
 6-S 1 DISKETTE DRIVE(S) AND ADAPTER
 9-S PRINTER ADAPTER
11-S ASYNC COMMUNICATIONS ADAPTER
47-S CLOCK ADAPTER

IS THIS LIST CORRECT (Y/N)? __
```

YES Press Y; then press Enter. Go to the next step.

NO Press N; then press Enter. Record the error message. If the keyboard was the missing unit, have it serviced. Otherwise, have the system unit serviced.

7. Does your screen match the example below?

```
SYSTEM CHECKOUT

0—RUN TESTS ONE TIME
1—RUN TESTS MULTIPLE TIMES
2—LOG UTILITIES
9—EXIT DIAGNOSTIC ROUTINES

ENTER THE ACTION DESIRED
? __
```

YES Press 0; then press Enter to select RUN TESTS ONE TIME. Go to the next step.

NO Have the system unit serviced.

8. Does your screen match the example below?

NOTE

This menu may vary depending upon the additional devices attached to Workmaster.

```
 1 - S SYSTEM BOARD
 2 - S 256KB MEMORY
 3 - S KEYBOARD
 5 - S GRAPHICS MONITOR ADAPTER
 6 - S 1 DISKETTE DRIVE(S) AND ADAPTER
 9 - S PRINTER ADAPTER
11 - S ASYNC COMMUNICATIONS ADAPTER
47 - S CLOCK ADAPTER

ENTER THE NUMBER(S) OF OPTIONS TO TEST
OR PRESS ENTER TO SELECT ALL OPTIONS
? __
```

YES Go to "Test 100-SYSTEM BOARD" and follow the procedure.

NO Have the system unit serviced.

TEST 100-SYSTEM BOARD

1. You came to this procedure with your screen matching the example below.

NOTE

This menu may vary depending upon the additional devices attached to Workmaster.

```
 1 - S SYSTEM BOARD
 2 - S 256KB MEMORY
 3 - S KEYBOARD
 5 - S GRAPHICS MONITOR ADAPTER
 6 - S 1 DISKETTE DRIVE(S) AND ADAPTER
 9 - S PRINTER ADAPTER
11 - S ASYNC COMMUNICATIONS ADAPTER
47 - S CLOCK ADAPTER

ENTER THE NUMBER(S) OF OPTIONS TO TEST
OR PRESS ENTER TO SELECT ALL OPTIONS
? __
```

2. Press 1; then press Enter to select SYSTEM BOARD.
3. Does your screen match the example below?

```
TESTING - SYSTEM BOARD
SYSTEM BOARD      100 S

SYSTEM CHECKOUT

0—RUN TESTS ONE TIME
1—RUN TESTS MULTIPLE TIMES
2—LOG UTILITIES
9—EXIT DIAGNOSTIC ROUTINES

ENTER THE ACTION DESIRED
? __
```

YES The system board has passed the diagnostic. Press 0; then press Enter to select RUN TESTS ONE TIME. Then go to "Test 200-256KB MEMORY."

NO Record any error code displayed and have the system unit serviced.

TEST 200-256KB MEMORY

1. You came to this procedure with your screen matching the example below.

NOTE

This menu may vary depending upon the additional devices attached to Workmaster.

```
 1 - S SYSTEM BOARD
 2 - S 256KB MEMORY
 3 - S KEYBOARD
 5 - S GRAPHICS MONITOR ADAPTER
 6 - S 1 DISKETTE DRIVE(S) AND ADAPTER
 9 - S PRINTER ADAPTER
11 - S ASYNC COMMUNICATIONS ADAPTER
47 - S CLOCK ADAPTER

ENTER THE NUMBER(S) OF OPTIONS TO TEST
OR PRESS ENTER TO SELECT ALL OPTIONS
? __
```

2. Press 2; then press Enter to select 256KB MEMORY.
3. Does your screen match the example below?

```
TESTING—256KB MEMORY
THIS TEST TAKES UP TO TWO MINUTES
PLEASE STAND BY

SYSTEM CHECKOUT

0—RUN TESTS ONE TIME
1—RUN TESTS MULTIPLE TIMES
2—LOG UTILITIES
9—EXIT DIAGNOSTIC ROUTINES

ENTER THE ACTION DESIRED
? __
```

YES Memory has passed the diagnostic. Press 0; then press Enter to select RUN TESTS ONE TIME. Then go to "Test 300-KEYBOARD."

NO Record any error code displayed and have the system unit serviced.

TEST 300-KEYBOARD

There is a test for each keyboard: the 91-key keyboard and the 83-key keyboard. The 91-key keyboard can operate in two modes: as a 91-character keyboard or as an 83-character keyboard. Therefore, there are tests for each mode under "91-Key Keyboard Test." Refer to "91-Character Mode" and "83-Character Mode" in this chapter.

The 83-key keyboard operates only as an 83-character keyboard.

NOTE

Proper functioning of the keyboard depends upon the keyboard being connected to the system unit before the power is switched on. If the keyboard is connected to the system after the power has been switched on, keyboard operation is unpredictable.

1. You came to this procedure with your screen matching the example below.

NOTE

This menu may vary depending upon the additional devices attached to Workmaster.

```
 1 - S SYSTEM BOARD
 2 - S 256KB MEMORY
 3 - S KEYBOARD
 5 - S GRAPHICS MONITOR ADAPTER
 6 - S 1 DISKETTE DRIVE(S) AND ADAPTER
 9 - S PRINTER ADAPTER
11 - S ASYNC COMMUNICATIONS ADAPTER
47 - S CLOCK ADAPTER

ENTER THE NUMBER(S) OF OPTIONS TO TEST
OR PRESS ENTER TO SELECT ALL OPTIONS
? __
```

2. Press 3; then press Enter to select KEYBOARD.
3. Does your screen match the example below?

```
TESTING - KEYBOARD
IS THE LOWER LEFT KEY LABELED "ABORT"? Y/N __
```

YES Look at the lower-left key and answer the question by pressing Y or N and then pressing Enter.

If you pressed Y, go to "91-Key Keyboard Test."

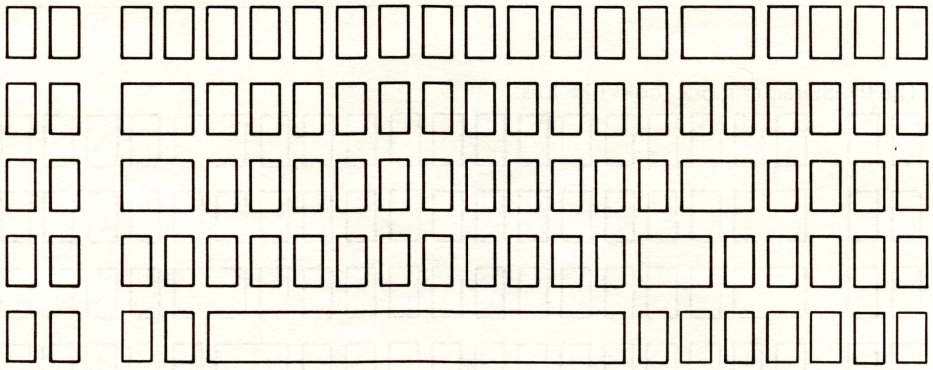
If you pressed N, go to "83-Key Keyboard Test"

NO Have your system unit serviced.

91-Key Keyboard Test

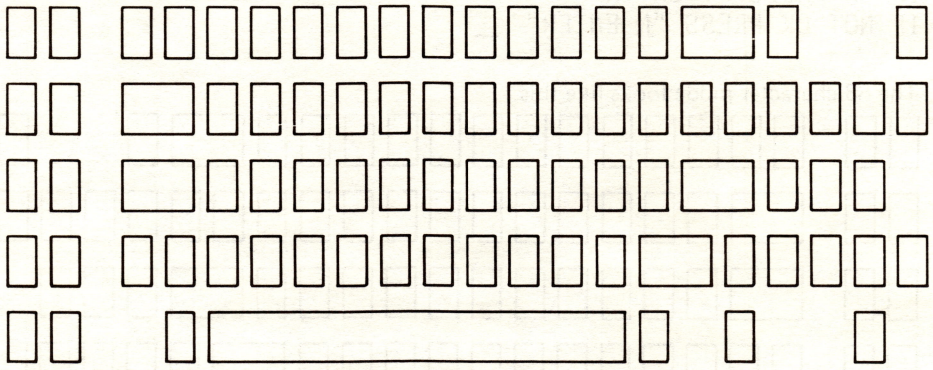
1. Does your screen look like the top half of the diagram below?

The 91 character mode looks like this.



```
PRESS EACH KEY (ONE AT A TIME)
HOLD ANY KEY FOR TYPEMATIC TEST
IF OK PRESS "Y ENTER"
IF NOT OK PRESS "N ENTER" _
```

The 83 character mode looks like this.



YES The 91-key keyboard can operate in either 91-character mode or in 83-character mode. To change to 83-key mode, hold down Ctrl and press Select. Your display changes to the configuration shown at the bottom of the example above. Each operation of the Ctrl and Select keys changes the mode of operation of the keyboard and the display. If this does not happen, have the system unit serviced. If Ctrl and Select changes modes as described, go to the next step.

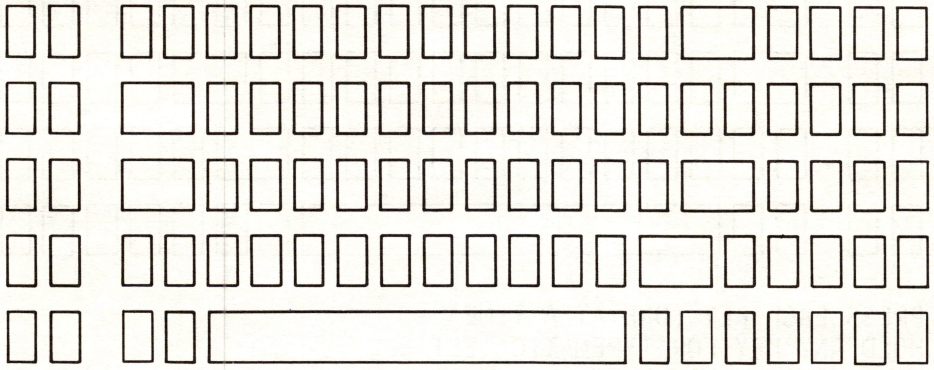
NO Have your system unit serviced.

2. You may test either the 91-character mode or the 83-character mode.

   To test the 91-character mode, use Ctrl and Select to match your display to the top half of the example. Then go to "91-Character Mode Test."

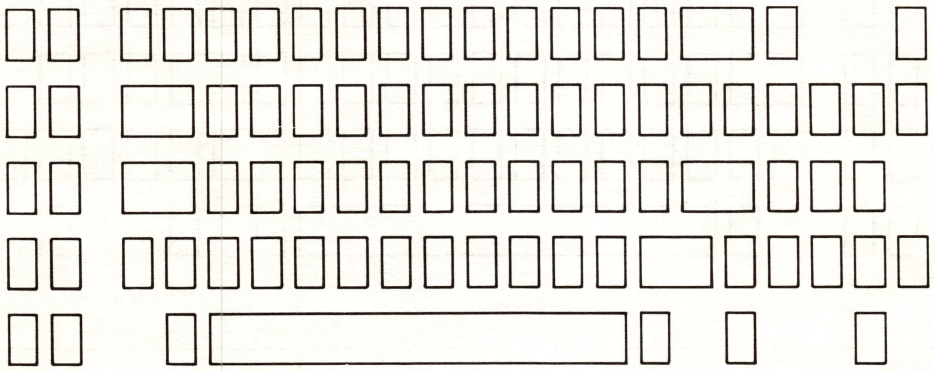
   To test the 83-character mode, use Ctrl and Select to match your display to the bottom half of the example. Then go to "83-Character Mode Test."

The 91 character mode looks like this.



```
PRESS EACH KEY (ONE AT A TIME)
HOLD ANY KEY FOR TYPEMATIC TEST
IF OK PRESS "Y ENTER"
IF NOT OK PRESS "N ENTER" _
```

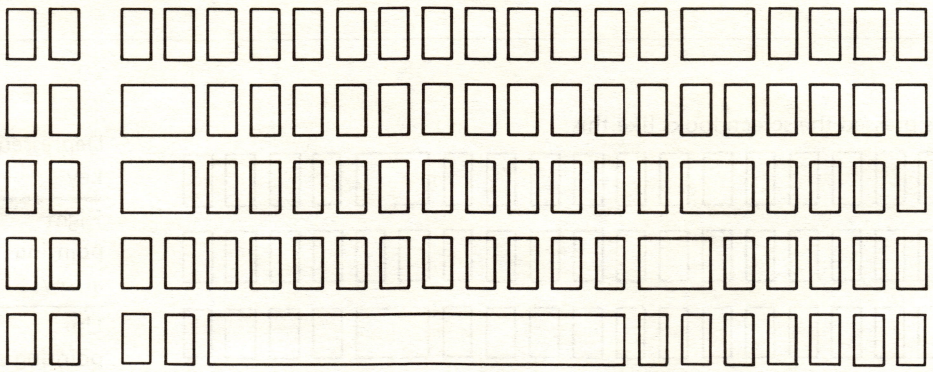
The 83 character mode looks like this.



91-Character Mode

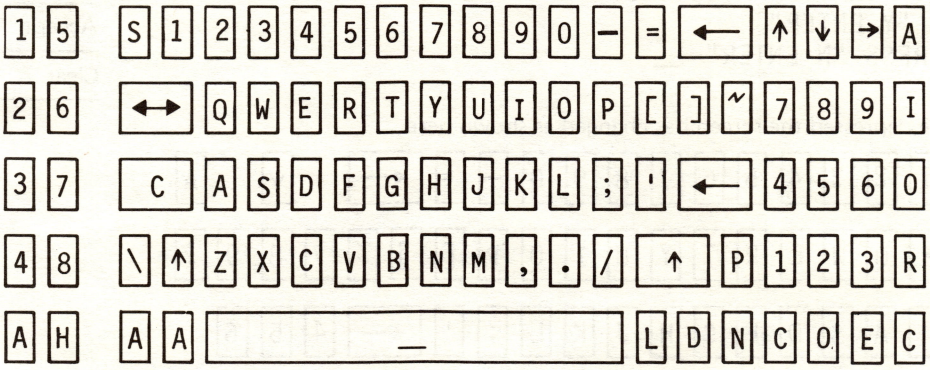
1. Follow the directions on your display to test the keyboard.

Before any key is pressed the screen looks like this.



```
PRESS EACH KEY (ONE AT A TIME)
HOLD ANY KEY FOR TYPEMATIC TEST
IF OK PRESS "Y ENTER"
IF NOT OK PRESS "N ENTER" _
```

After all keys are depressed the screen has changed as shown here.



2. Did your keyboard operate correctly?

YES Press Y; then press Enter. Go to "For All Keyboards or Modes."

NO Press N; then press Enter. Record any error code displayed and have the keyboard serviced.

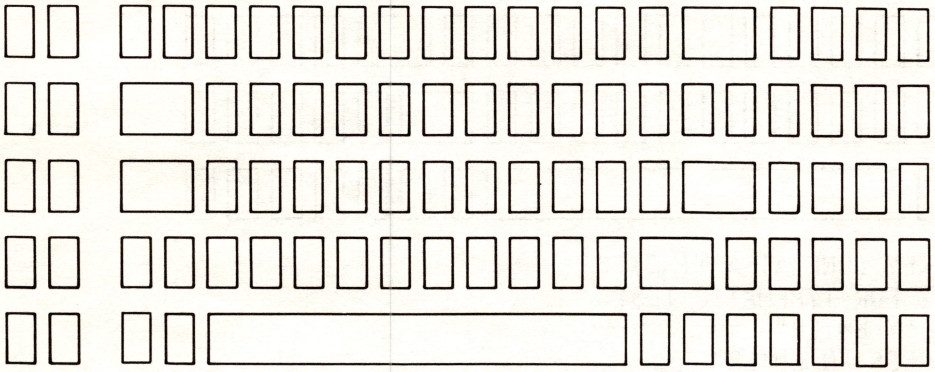
83-Character Mode

1. Follow the directions on your display to test the keyboard.

NOTE

When a key not used in the 83-character mode is pressed, the signal sent is shown in the table below.

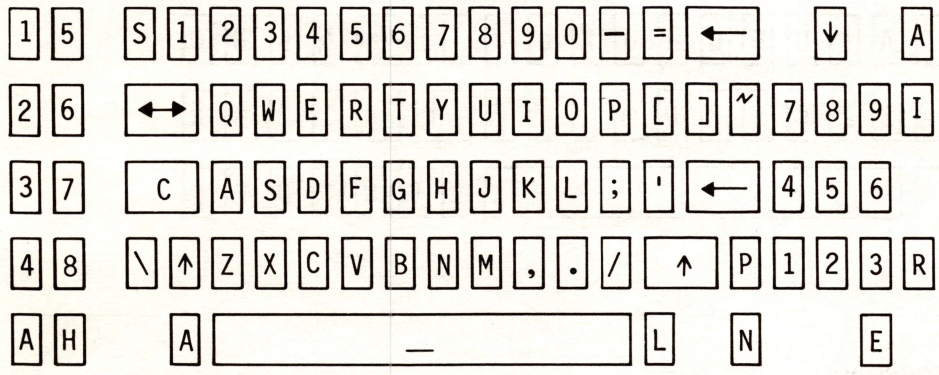
Before any key is pressed the screen looks like this.



```
PRESS EACH KEY (ONE AT A TIME)
HOLD ANY KEY FOR TYPEMATIC TEST
IF OK PRESS "Y ENTER"
IF NOT OK PRESS "N ENTER" _
```

Depressed key	Displayed key
Right pointing arrow	A
Up pointing arrow	Down pointing arrow
"DEC-0" or "DP-C"	R
Delete	E
0	Next
Accept	A
Clear	E

After all keys are depressed the screen has changed as shown here.



2. Did your keyboard operate correctly?

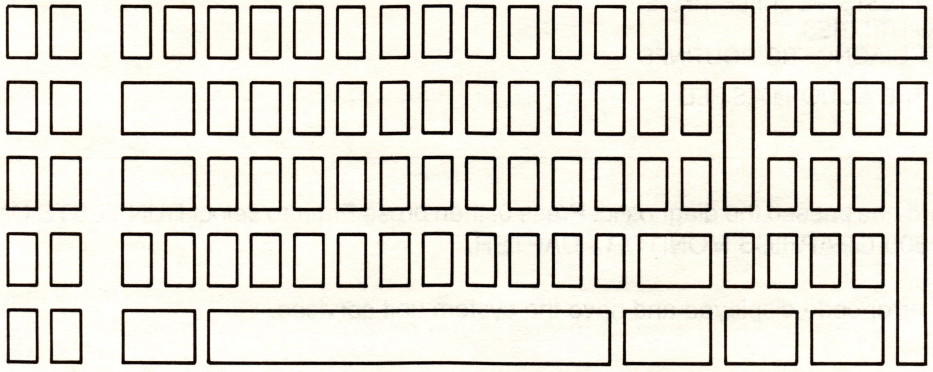
YES Press Y; then press Enter. Go to "For All Keyboards or Modes."

NO Press N; then press Enter. Record any error code displayed and have the keyboard serviced.

83-Key Keyboard Test

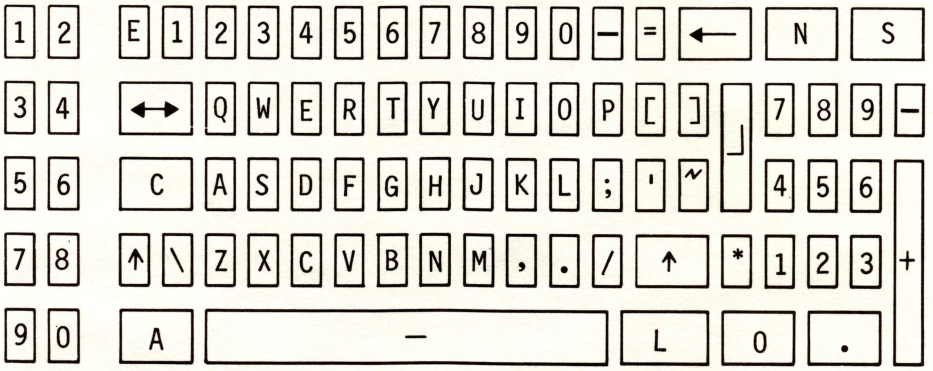
1. Follow the directions on your display to test the keyboard.

Before any key is pressed the screen looks like this.



```
PRESS EACH KEY (ONE AT A TIME)
HOLD ANY KEY FOR TYPEMATIC TEST
IF OK PRESS "Y ENTER"
IF NOT OK PRESS "N ENTER" _
```

After all keys are depressed the screen has changed as shown here.



---

2. Did your keyboard operate correctly?

YES Press Y; then press Enter. Go to "For All Keyboards or Modes."

No Press N; then press Enter. Record any error code displayed and have the keyboard serviced.

For All Keyboards or Modes

1. Does your display match the example below?

```
SYSTEM CHECKOUT

0—RUN TESTS ONE TIME
1—RUN TESTS MULTIPLE TIMES
2—LOG UTILITIES
9—EXIT DIAGNOSTIC ROUTINES

ENTER THE ACTION DESIRED
? __
```

YES The keyboard has passed the diagnostic. Press 0; then press Enter to select RUN TESTS ONE TIME. Then go to "Test 500-GRAPHICS MONITOR ADAPTER."

NO Record any error code displayed and have the system unit serviced.

TEST 500-GRAPHICS MONITOR ADAPTER

1. You came to this procedure with your screen matching the example below.

NOTE

This menu may vary depending upon the additional devices attached to Workmaster.

```
 1 - S SYSTEM BOARD
 2 - S 256KB MEMORY
 3 - S KEYBOARD
 5 - S GRAPHICS MONITOR ADAPTER
 6 - S 1 DISKETTE DRIVES AND ADAPTER
 9 - S PRINTER ADAPTER
11 - S ASYNC COMMUNICATIONS ADAPTER
47 - S CLOCK ADAPTER

ENTER THE NUMBER(S) OF OPTIONS TO TEST
OR PRESS ENTER TO SELECT ALL OPTIONS
? __
```

2. Press 5; then press Enter to select GRAPHICS MONITOR ADAPTER.
3. Does the display match the example below?

```
GRAPHICS MONITOR ADAPTER TEST
 0 - DISPLAY ADAPTER TEST
 1 - DISPLAY ATTRIBUTES
 2 - CHARACTER SET
 3 - 80X25 DISPLAY
 4 - 40X25 DISPLAY
 5 - 320X200 GRAPHICS
 6 - 640X200 GRAPHICS
 7 - LIGHT PEN TEST
 8 - SCREEN PAGING
 9 - EXIT TO MAIN MENU
10 - RUN ALL ABOVE TESTS
11 - VIDEO TEST
12 - SYNC TEST
ENTER NUMBER OF DESIRED ACTION __
```

YES Go to the next step.

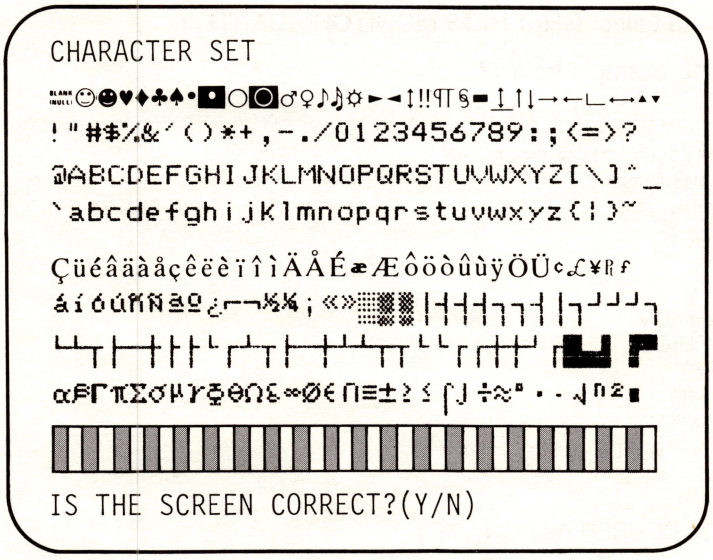
NO Record any error code displayed and have the system unit serviced.

4. Press 10; then press Enter to select RUN ALL ABOVE TESTS.
5. Ten different screens will be displayed. Each screen represents one test. The screens will ask you questions; you must answer Yes (Y) or No (N). Follow the directions on each screen to complete the tests. The following figures show the ten screens in the sequence in which they will appear.

Screen 1

```
THIS LINE IS AT NORMAL INTENSITY
THIS LINE IS INTENSIFIED
THIS LINE IS IN REVERSE VIDEO
THIS LINE IS BLINKING
IS THE SCREEN CORRECT? Y/N
```

Screen 2



Screen 3

```
80X25 DISPLAY
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOP
#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQ
$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQR
%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRS
&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRST
'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTU
()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUV
)*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVW
*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWX
+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXY
,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ
-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[
./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\
/0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]
0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^
123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_

IS THE SCREEN CORRECT?(Y/N)__
```

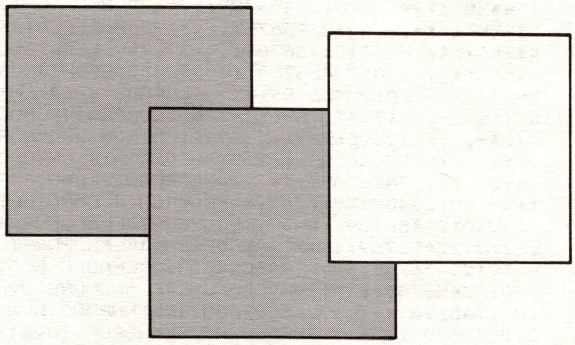
Screen 4

```
40X25 DISPLAY
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEF
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFG
"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGH
#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHI
$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJ
%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJK
&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKL
'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLM
()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
)*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOP
+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQ
,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQR
-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRS
./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRST
/0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTU
0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUV
123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVW

IS THE SCREEN CORRECT?(Y/N)
```

Screen 5

320X200 GRAPHICS



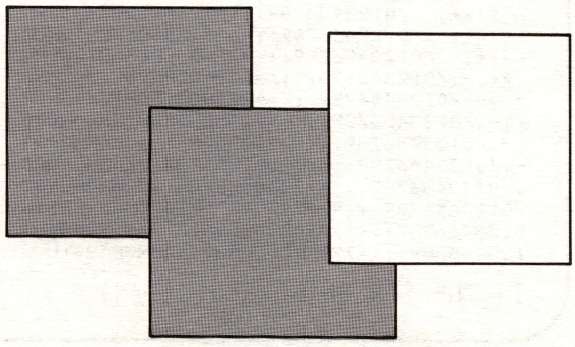
IS THE SCREEN CORRECT?(Y/N) _

Screen 6

NOTE

The following screen should be exactly like the screen above, except that it will be less bright.

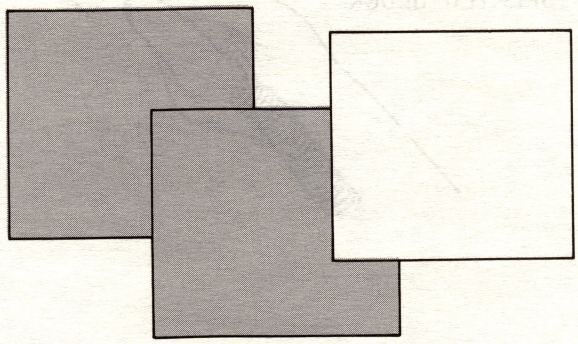
320X200 GRAPHICS



IS THE SCREEN CORRECT?(Y/N) _

Screen 7

640X200 GRAPHICS



IS THE SCREEN CORRECT?(Y/N) _

Screen 8

LIGHT PEN TEST

SKIP LIGHT PEN TEST?-

NOTE

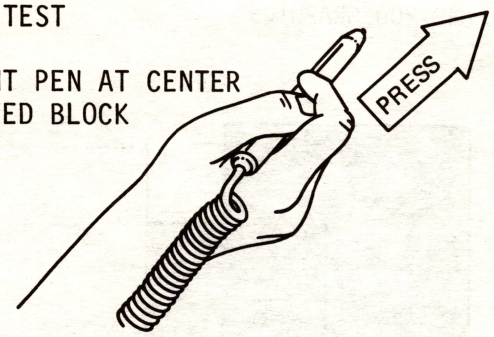
If you do not have a light pen, press Y; then press Enter.

Screen 9

LIGHT PEN TEST

PRESS LIGHT PEN AT CENTER
OF DISPLAYED BLOCK

*



Screen 10

VIDEO PAGE 0

TYPE ANY KEY TO DISPLAY NEXT PAGE

NOTE

Follow the instructions on the screen. The numbered pages should appear in sequence from 0 to 7 and back to 0.

6. When the tests have completed, does your screen match the example below?

```
SYSTEM CHECKOUT

0—RUN TESTS ONE TIME
1—RUN TESTS MULTIPLE TIMES
2—LOG UTILITIES
9—EXIT DIAGNOSTIC ROUTINES

ENTER THE ACTION DESIRED
? __
```

YES The graphics monitor adapter has passed the diagnostic. Press 0; then press Enter to select RUN TESTS ONE TIME. Then go to "Test 600 - 1 DISKETTE DRIVE(S) AND ADAPTER."

NO Record any error code displayed and have the system unit serviced.

TEST 600-1 DISKETTE DRIVE(S) AND ADAPTER

NOTE

This test requires a formatted diskette. To prepare one, refer to "Diskette Format Procedure" in this chapter.

1. You came to this procedure with your screen matching the example below.

NOTE

This menu may vary depending upon the additional devices attached to Workmaster.

```
 1 - S SYSTEM BOARD
 2 - S 256KB MEMORY
 3 - S KEYBOARD
 5 - S GRAPHICS MONITOR ADAPTER
 6 - S 1 DISKETTE DRIVE(S) AND ADAPTER
 9 - S PRINTER ADAPTER
11 - S ASYNC COMMUNICATIONS ADAPTER
47 - S CLOCK ADAPTER

ENTER THE NUMBER(S) OF OPTIONS TO TEST
OR PRESS ENTER TO SELECT ALL OPTIONS
? __
```

2. Press 6; then press Enter to select 1 DISKETTE DRIVE(S) AND ADAPTER. Then go to the next step.
3. Does your screen match the example below?

```
TESTING - 1 DISKETTE DRIVE(S) & ADAPTER

DISKETTE DIAGNOSTIC MENU

OPTION                              DRIVE
1—SEQUENTIAL ACCESS                 ONE DRIVE
2—RANDOM SEEK                       ONE DRIVE
3—VERIFY DISKETTE                   ONE DRIVE
4—SPEED TEST                        ONE DRIVE
9—RETURN TO CONTROL PROGRAM

FOR OPTION 9
ENTER "9" AND "ENTER"
FOR OTHER OPTIONS (1 THRU 4)
ENTER OPTION, DRIVE AND "ENTER"
? __
```

YES Go to the next step.

NO Record any error code displayed and have the system unit serviced.

4. Select each of the four tests (1 through 4) by entering the test number followed by a comma and the drive designation. Press 1,A; then press Enter to perform Test 1 on drive A.

NOTE

A warning message will appear on the screen. Remove the Diagnostics diskette from the specified drive and insert the formatted diskette in its place.

Test 1,SEQUENTIAL ACCESS, may take up to 10 minutes to complete its procedure.

For each test, follow directions on the screen. When the drive size is displayed, press Y if the size is 720KB.

NOTE

720KB is the drive size for dual-sided drives. If your unit is installed with single-sided drives, then the drive size is 360KB.

5. If you receive an error message, record the message and have the diskette drive serviced.
6. After running all four tests, press 9; then press Enter to select RETURN TO CONTROL PROGRAM.
7. Does your display match the example below?

```
SYSTEM CHECKOUT

0—RUN TESTS ONE TIME
1—RUN TESTS MULTIPLE TIMES
2—LOG UTILITIES
9—EXIT DIAGNOSTIC ROUTINES

ENTER THE ACTION DESIRED
?  —
```

YES The diskette drive(s) and adapter have passed the diagnostic. Press 0; then press Enter to select RUN TESTS ONE TIME. Then go to "Test 700 - MATH COPROCESSOR."

NO Record any error code displayed and have the system unit serviced.

TEST 700-MATH COPROCESSOR

NOTE

If 7 - S MATH COPROCESSOR is not a part of your test selection menu, the coprocessor is not part of your system. Skip this test and go to "Test 900 - PRINTER ADAPTER."

1. You came to this procedure with your screen matching the example below.

NOTE

This menu may vary depending upon the additional devices attached to Workmaster.

```
 1 - S SYSTEM BOARD
 2 - S 256KB MEMORY
 3 - S KEYBOARD
 5 - S GRAPHICS MONITOR ADAPTER
 6 - S 1 DISKETTE DRIVES AND ADAPTER
 7 - S MATH COPROCESSOR
 9 - S PRINTER ADAPTER
11 - S ASYNC COMMUNICATIONS ADAPTER
47 - S CLOCK ADAPTER

ENTER THE NUMBER(S) OF OPTIONS TO TEST
OR PRESS ENTER TO SELECT ALL OPTIONS
? __
```

2. Press 7; then press Enter to select MATH COPROCESSOR.
3. The message in the example below should appear on your screen for up to 10 seconds. Then the SYSTEM CHECKOUT menu should appear.
4. Does your display match the example below?

```
TESTING MATH COPROCESSOR

SYSTEM CHECKOUT

0—RUN TESTS ONE TIME
1—RUN TESTS MULTIPLE TIMES
2—LOG UTILITIES
9—EXIT DIAGNOSTIC ROUTINES

ENTER THE ACTION DESIRED
? __
```

YES The math coprocessor has passed the diagnostic. Press 0; then press Enter to select RUN TESTS ONE TIME. Then go to "Test 900 - PRINTER ADAPTER."

NO Record any error code displayed and have the system unit serviced.

TEST 900-PRINTER ADAPTER

1. You came to this procedure with your screen matching the example below.

NOTE

This menu may vary depending upon the additional devices attached to Workmaster.

```
 1 - S SYSTEM BOARD
 2 - S 256KB MEMORY
 3 - S KEYBOARD
 5 - S GRAPHICS MONITOR ADAPTER
 6 - S 1 DISKETTE DRIVE(S) AND ADAPTER
 9 - S PRINTER ADAPTER
11 - S ASYNC COMMUNICATIONS ADAPTER
47 - S CLOCK ADAPTER

ENTER THE NUMBER(S) OF OPTIONS TO TEST
OR PRESS ENTER TO SELECT ALL OPTIONS
?
```

2. Press 9; then press Enter to select PRINTER ADAPTER.
3. Does your screen match the example below?

```
TESTING PRINTER ADAPTER

DO YOU HAVE A PRINTER WRAP PLUG? Y/N
?
```

4. Insert the wrap plug if it is available, and press Y or N as appropriate. Then, press Enter.
5. Did the 900 S message and then the SYSTEM CHECKOUT menu appear as shown below?

```
TESTING PRINTER ADAPTER

DO YOU HAVE A PRINTER WRAP PLUG? Y/N
? n

PRINTER ADAPTER          900 S

SYSTEM CHECKOUT

0—RUN TESTS ONE TIME
1—RUN TESTS MULTIPLE TIMES
2—LOG UTILITIES
9—EXIT DIAGNOSTIC ROUTINES

ENTER THE ACTION DESIRED
?
```

YES The printer adapter has passed the diagnostic. Press 0; then press Enter to select RUN TESTS ONE TIME. Then go to "Test 1100 - ASYNC COMMUNICATIONS ADAPTER."

NO Record any error code displayed and have the system unit serviced.

TEST 1100-ASYNC COMMUNICATIONS ADAPTER

1. You came to this procedure with your screen matching the example below.

NOTE

This menu may vary depending upon the additional devices attached to Workmaster.

```
 1 - S SYSTEM BOARD
 2 - S 256KB MEMORY
 3 - S KEYBOARD
 5 - S GRAPHICS MONITOR ADAPTER
 6 - S 1 DISKETTE DRIVE(S) AND ADAPTER
 9 - S PRINTER ADAPTER
11 - S ASYNC COMMUNICATIONS ADAPTER
47 - S CLOCK ADAPTER

ENTER THE NUMBER(S) OF OPTIONS TO TEST
OR PRESS ENTER TO SELECT ALL OPTIONS
? __
```

2. Press 11; then press Enter to select ASYNC COMMUNICATIONS ADAPTER.
3. Does your screen match the example below?

```
TESTING ASYNC COMMUNICATIONS ADAPTER

DO YOU HAVE A WRAP PLUG Y/N
? __
```

4. Insert the wrap plug if it is available, and press Y or N as appropriate. Then, press Enter.
5. Did the 1100 S message and then the SYSTEM CHECKOUT menu appear as shown below?

```
TESTING ASYNC COMMUNICATIONS ADAPTER

DO YOU HAVE A WRAP PLUG Y/N
? n

ASYNC COMMUNICATIONS ADAPTER          1100 S

SYSTEM CHECKOUT

0—RUN TESTS ONE TIME
1—RUN TESTS MULTIPLE TIMES
2—LOG UTILITIES
9—EXIT DIAGNOSTIC ROUTINES

ENTER THE ACTION DESIRED
? __
```

YES The Asynchronous Communications Adapter has passed the diagnostic. Press 0; then press Enter to select RUN TESTS ONE TIME. Then go to "Test 4700 - CLOCK ADAPTER."

NO Record any error code displayed and have the system unit serviced.

TEST 4700-CLOCK ADAPTER

1. You came to this procedure with your screen matching the example below.

NOTE

This menu may vary depending upon the additional devices attached to Workmaster.

```
 1 - S SYSTEM BOARD
 2 - S 256KB MEMORY
 3 - S KEYBOARD
 5 - S GRAPHICS MONITOR ADAPTER
 6 - S 1 DISKETTE DRIVE(S) AND ADAPTER
 9 - S PRINTER ADAPTER
11 - S ASYNC COMMUNICATIONS ADAPTER
47 - S CLOCK ADAPTER

ENTER THE NUMBER(S) OF OPTIONS TO TEST
OR PRESS ENTER TO SELECT ALL OPTIONS
? __
```

2. Press 47; then press Enter to select CLOCK.
3. Does your screen match the example below?

```
CLOCK DIAGNOSTIC MENU
OPTION
1—CLOCK TEST
2—SWITCH TEST
9—RETURN TO CONTROL PPROGRAM

ENTER OPTION, THEN "ENTER"
? __
```

YES Go to the next step.

NO Record any error code displayed and have the system unit serviced.

4. Select each of the two tests (1 and 2) in turn.

   Press 1; then press Enter. Follow the directions on your screen and answer questions as appropriate. Record any error messages you receive. When the test is completed, press 2; then press Enter. Follow directions on your screen and answer questions as appropriate. Record any error messages you receive.

   After performing both tests, press 9; then press Enter to select RETURN TO CONTROL PROGRAM.

5. Does the CLOCK ADAPTER 4700 S message followed by the SYSTEM CHECKOUT menu, as shown below, appear on your screen?

```
CLOCK ADAPTER        4700  S
SYSTEM CHECKOUT
0—RUN TESTS ONE TIME
1—RUN TESTS MULTIPLE TIMES
2—LOG UTILITIES
9—EXIT DIAGNOSTIC ROUTINES
ENTER THE ACTION DESIRED
?  —
```

YES The Clock Adapter has passed the diagnostic. You have completed system checkout.

NO Record any error code displayed and have the system unit serviced.

CHAPTER 4
OPTION INSTALLATION

This chapter is divided into two sections: "Hardware Description" and "Installing Options." The first part of the chapter describes the hardware. To learn about the Workmaster™ hardware, read the following sections:

- System Unit
- 91-Key Keyboard
- 83-Key Keyboard
- Diskette Drive
- Display.

After you learn about the hardware, you are ready to install the options. Read the following sections:

- Installation Requirements
- Installation Procedures
- Setting Switches to Reflect Options.

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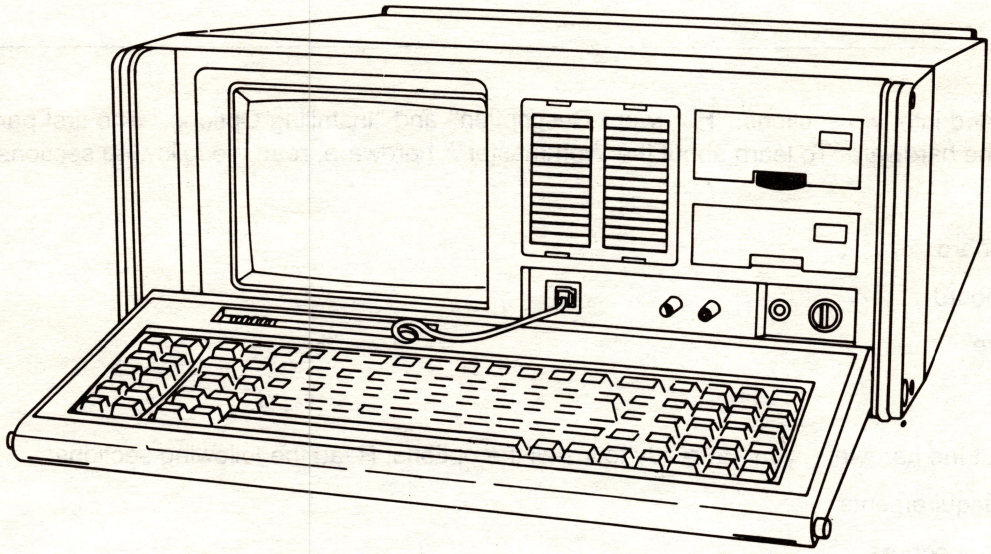
HARDWARE DESCRIPTION

SYSTEM UNIT



To operate the system unit, set the Power switch to On. Wait for the system unit to complete the power-on self-test. Then, you can use the keyboard to enter commands to the system unit. You will see your commands and the system responses on the display.

KEYBOARDS

The Workmaster has a standard 91-key keyboard. An 83-key keyboard is also available for Workmaster. This section describes the function of each key on the standard keyboard.

NOTE

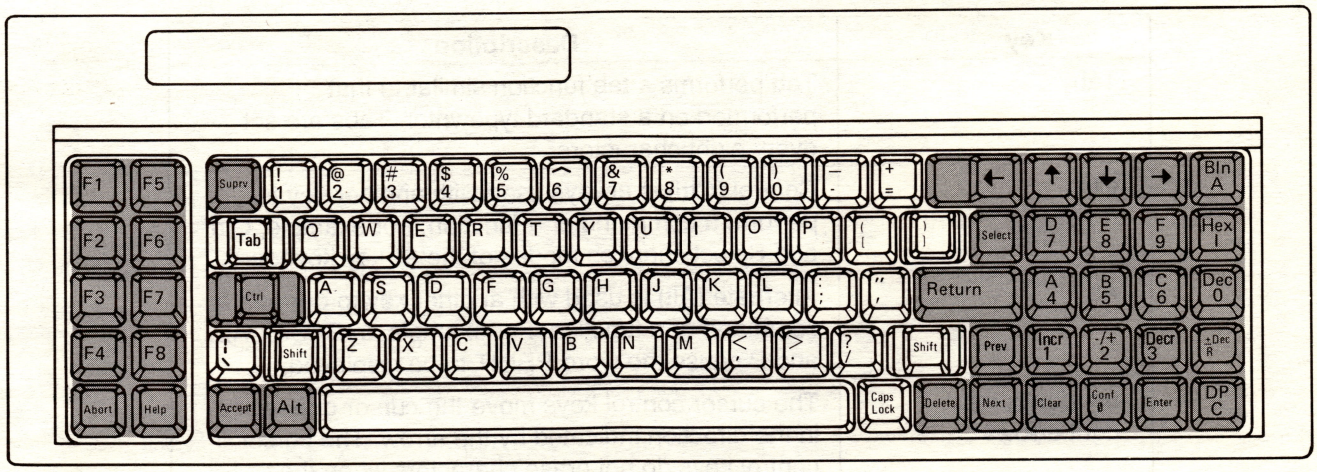
The keyboard cable must be connected to the system unit before the unit's power is switched on. Connecting or disconnecting the keyboard cable after the power is switched on may cause unpredictable results. The system unit's power must be switched off when the keyboard cable is being connected or disconnected.

The descriptions of the 91-key and the 83-key keyboards are divided into three sections:

- Standard typewriter keys
- Special keys
- Software-controlled keys.

91-Key Keyboard

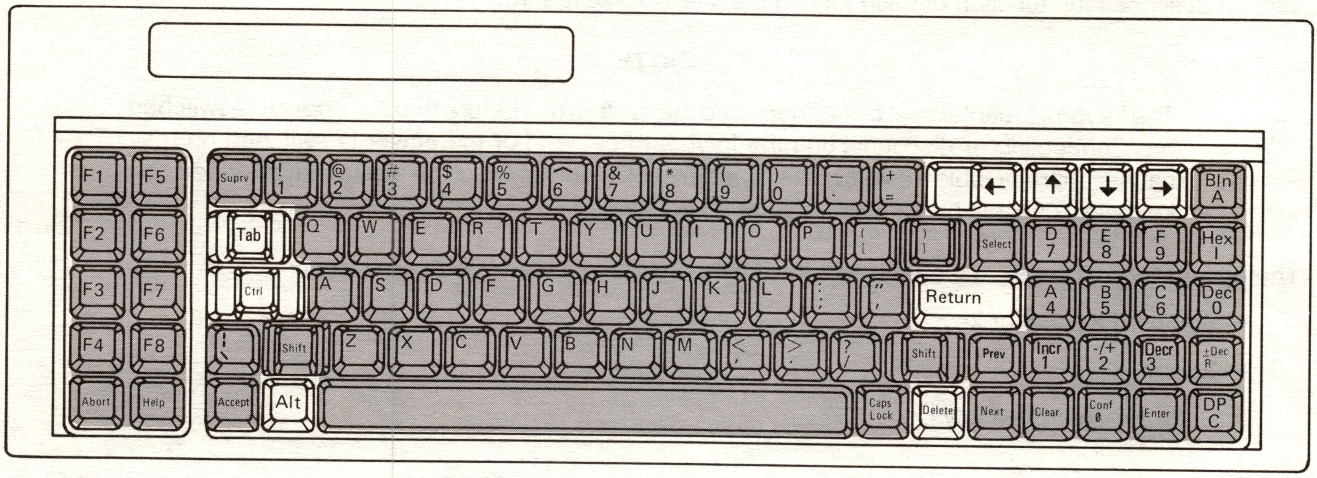
Typewriter Keys



The unshaded keys shown above are used in the same way that the keys on a standard typewriter are used.

All typewriter keys on the keyboard are *typematic*. This means that they repeat their function for as long as you press them.

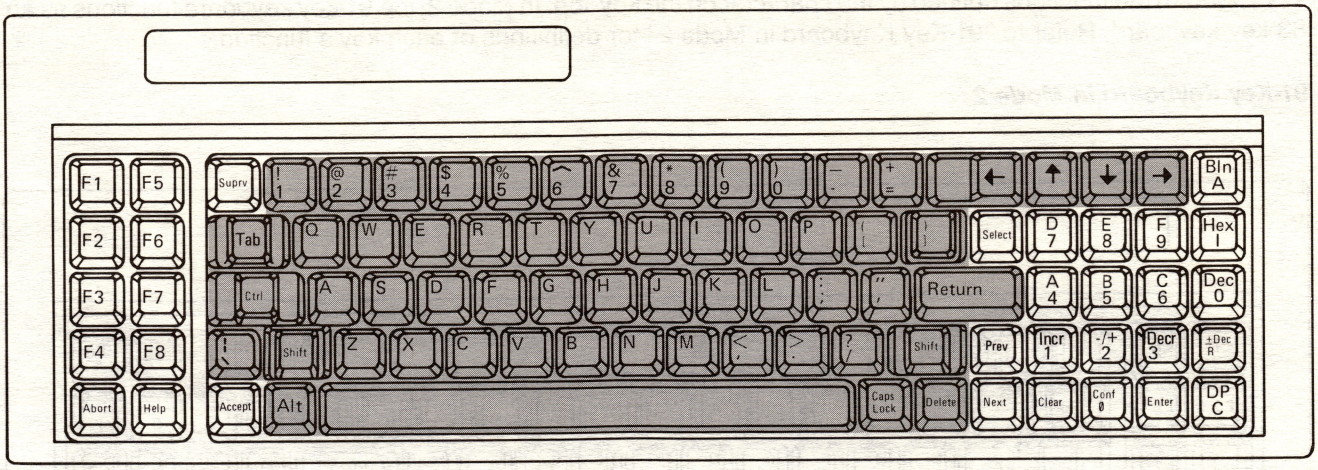
Special Keys



The unshaded keys shown above are defined in the following table:

Key	Description
Tab	Tab performs a tab function similar to that performed on a standard typewriter. Tabs are set every eight characters.
Ctrl	Control (Ctrl) is always used with another key to perform a command or a function. For example, Ctrl and Select changes modes of the 91-key keyboard.
Alt	Alternate (Alt) is used with another key to perform a command or a function. For example, in BASIC, Alt and P cause the word PRINT to be displayed.
up, down, left, right arrows	The cursor control keys move the cursor one space in the direction indicated by the arrow. The cursor control keys do not erase characters when the keyboard is operating in Mode 1; in Mode 2, the cursor left key erases existing characters.
Return	Return moves the cursor from its current position on one line to the first character on the next line.
Delete	Delete erases the character in the cursor position.
Alt with Bin A	Alternate (Alt) with Binary A (Bin A) performs a numeric lock (numlock) function.

Software-Controlled Keys

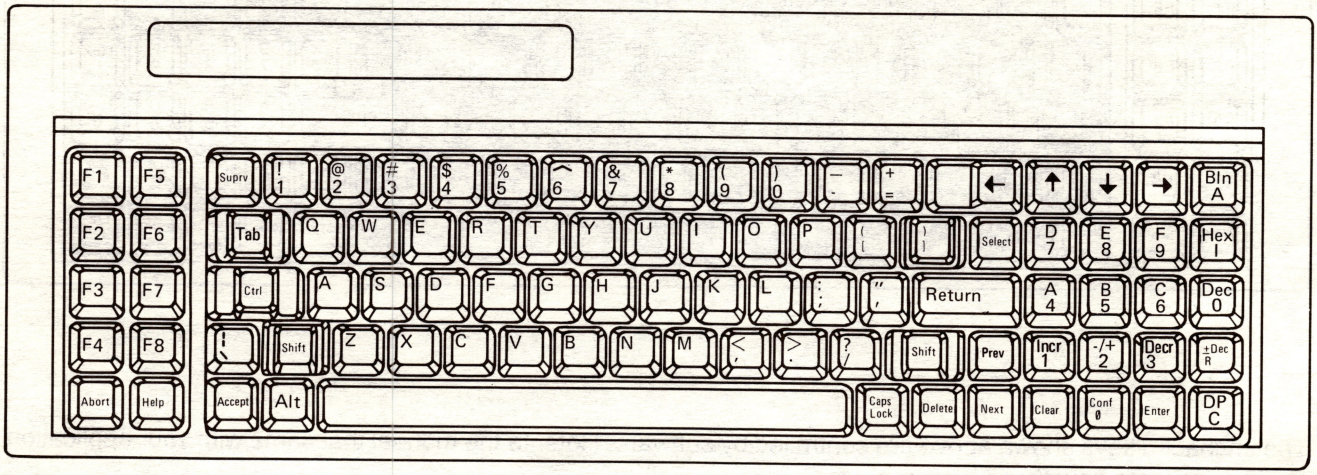


The unshaded keys shown above are controlled by software. Refer to the manual that came with your application program to learn how these keys are used.

Two Modes of the 91-Key Keyboard

The 91-key keyboard can operate in two modes. In Mode 1, the keyboard functions as a 91-key keyboard, and the keys perform the functions defined by the character on the key-top. In Mode 2, the 91-key keyboard functions as an 83-key keyboard. Refer to "91-Key Keyboard in Mode 2" for definitions of each key's function.

91-Key Keyboard in Mode 2



When it is operating in Mode 2, the 91-key keyboard performs like an 83-key keyboard. To put the keyboard in Mode 2, press Ctrl and Select. To return to Mode 1, press Ctrl and Select.

The following table identifies the keys that perform differently in Mode 2. The table defines how those keys function in Mode 2.

Mode 1 key function	Mode 2 key function
Accept	Alternate
Left arrow	Backspace (erases character)
Right arrow	Scroll Lock
Up arrow	Num Lock
Down arrow	Num Lock
Dec/0	Plus
+/− Dec/R	Plus
Clear	0/Ins

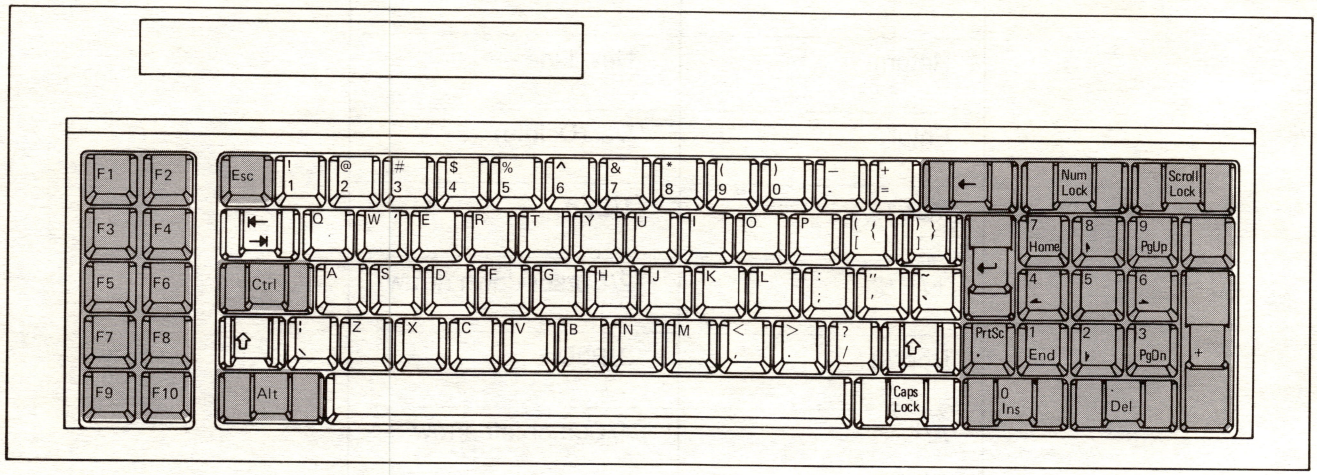
Figure 4-1 (Part 1 of 2)
KEY FUNCTIONS OF THE 91-KEY KEYBOARD

Mode 1 key function	Mode 2 key function
Conf/0	0/Ins
Return	New Line
Enter	Del (Delete)
Incr/1	1/End
+/−/2	2/Cursor down arrow
Decr/3	3/PgDn
A/4	4/Cursor left arrow
B/5	5
C/6	6/Cursor right arrow
D/7	7/Home
E/8	8/Cursor up arrow
F/9	9/Pg up
Suprv	Esc (Escape)
Tab	Tab
Select	Tilde/Grave accent
Abort	F9
Help	F10
DP/C	+ (Plus)
Prev	PrtSc
Next	0/Ins

Figure 4-1 (Part 2 of 2)
KEY FUNCTIONS OF THE 91-key keyboard

83-Key Keyboard

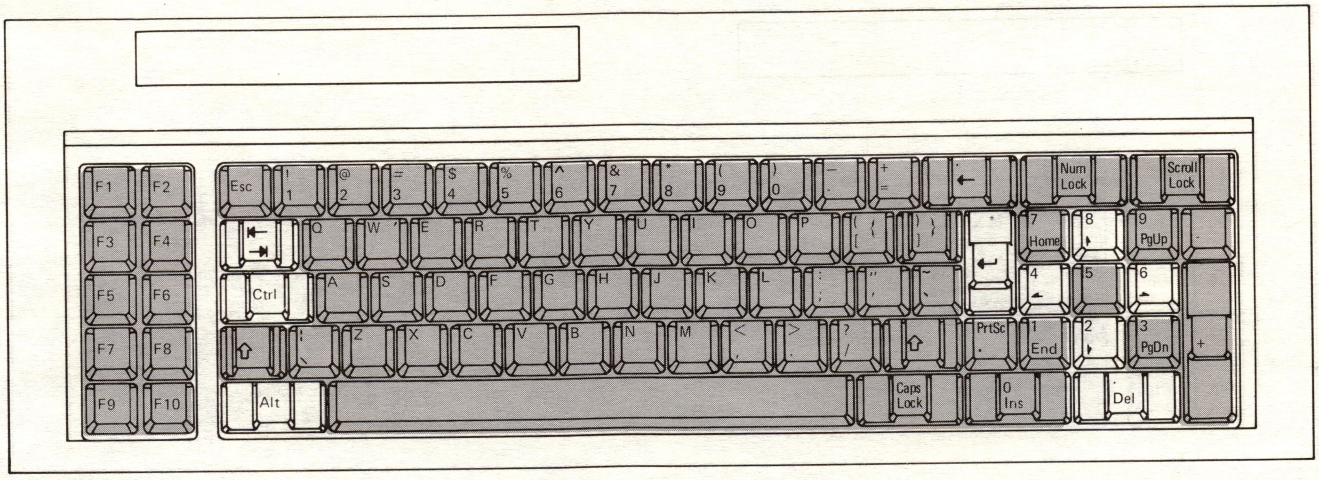
The Typewriter Keys



The unshaded keys shown above are used in the same way that the keys on a standard typewriter are used.

All typewriter keys are *typematic*. This means that they repeat their function for as long as you press them.

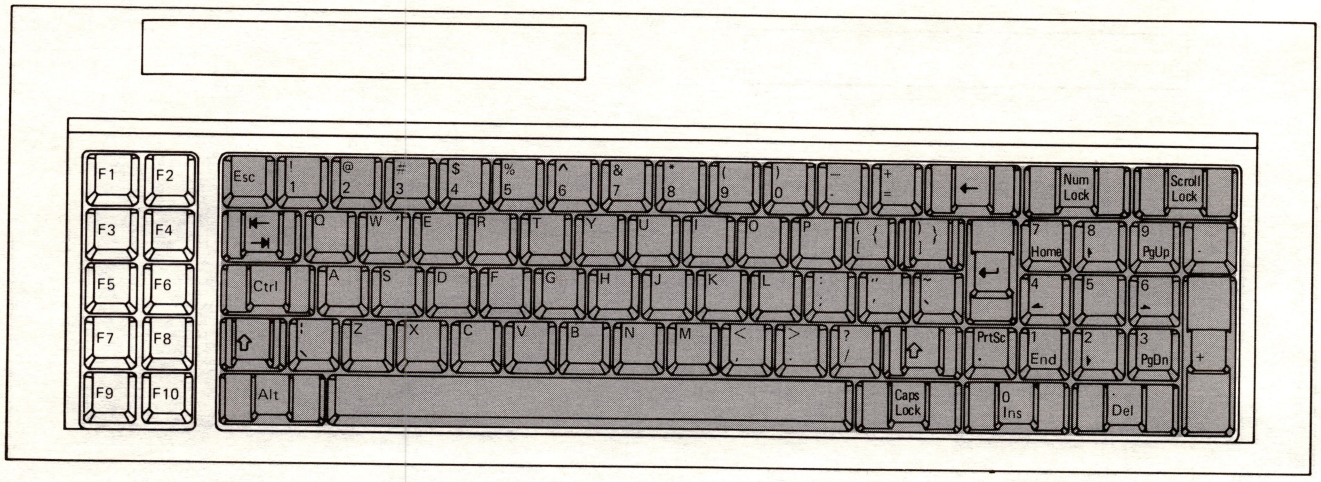
Special Keys



The unshaded keys shown above are defined in the following table.

Key	Description
Tab	Tab performs a function similar to that performed on a standard typewriter. Tabs are set every eight characters.
Ctrl	Control (Ctrl) is always used with another key to perform a command or a function. For example, operating under BASIC, Ctrl and Break stop the operation of the BASIC program.
Alt	Alternate (Alt) is used with another key to perform a command or a function. For example, in BASIC, Alt and P causes the word PRINT to be displayed.
up, down, left, right arrows in keypad region	The cursor control keys in the keypad region move the cursor one space in the direction indicated by the arrow. The cursor control keys do not erase existing characters.
Backspace	Backspace moves the cursor one space to the left, erasing the existing character.
New Line (key with bent arrow pointing to left)	New Line moves the cursor from its current position to the first character on the next line.
Del	Delete erases the character in the cursor position.

Software-Controlled Keys



The unshaded keys shown above are controlled by software. Refer to the manual that came with your application program to learn how these keys are used.

DISKETTE DRIVE

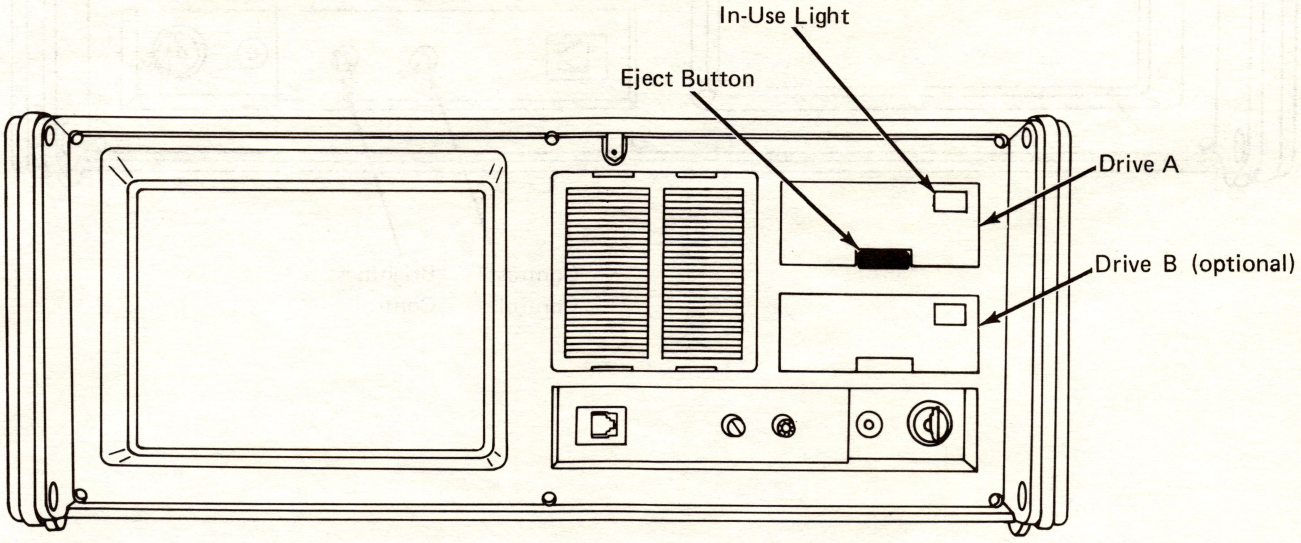
The diskette drive is used to load and store programs and data. The top diskette drive is referred to as drive A, and the bottom one, if installed, as drive B. For proper operation, follow the procedure below:

1. Lift the diskette drive door and insert the diskette in the drive with the metal hub of the diskette on the bottom side until the diskette snaps into place. The eject button pops out when the diskette has been inserted incorrectly. The diskette drive is now ready to be used.

WARNING

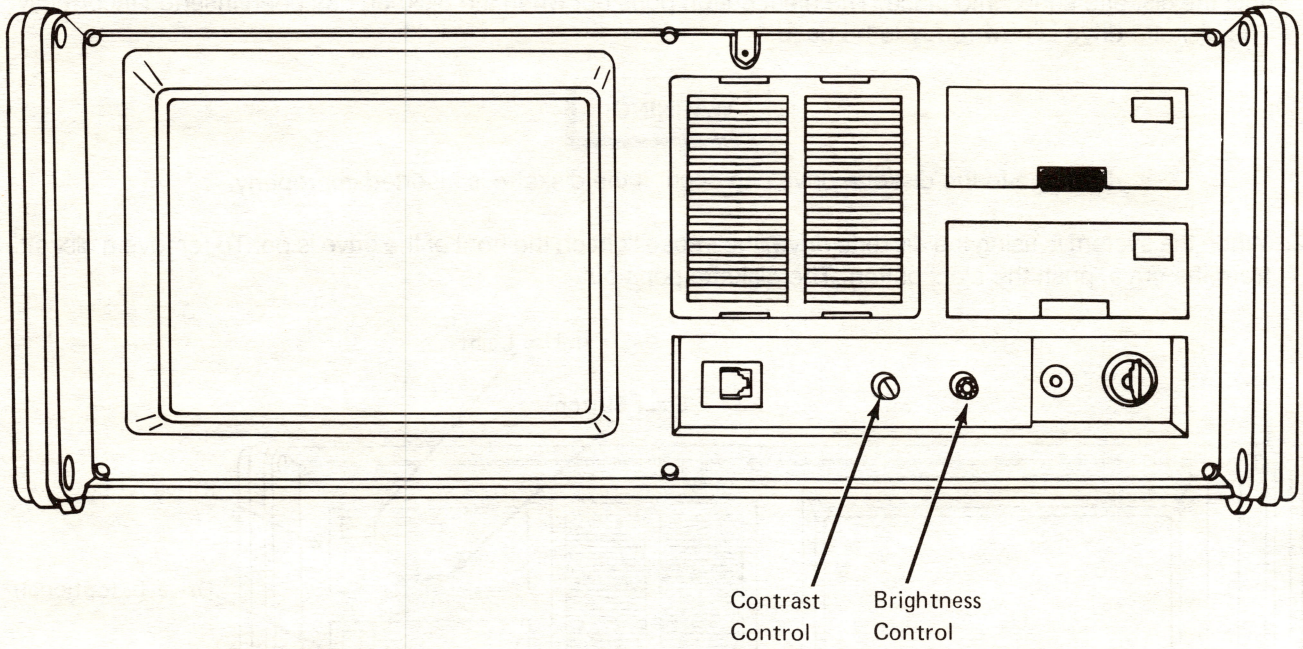
Damage to the diskette drive can occur if the diskette is inserted improperly.

2. When the system is using the diskette drive, the in-use light on the front of the drive is on. To remove a diskette from the drive, push the eject button. The diskette pops out.



DISPLAY

Controls: Adjust the contrast and brightness controls for eye comfort. Turning the controls clockwise causes the screen to get brighter. Turning the controls counterclockwise causes the screen to get darker.



INSTALLING OPTIONS

This section, when used with the instructions provided with the purchased option, shows you how to install an option in the Workmaster.

A complete installation procedure is included in this section. Before you proceed, review the "Installation Requirements" and "Tools Required" sections that follow to make sure you have everything you need to install an option.

Some of the options that you can install may require changes to the switches on the system board or on the option itself. Switch-setting charts are provided in "Setting Switches to Reflect Options."

INSTALLATION REQUIREMENTS

- If you have not set up the Workmaster, go to Chapter 2, "Installation," and set up the system unit. Ensure that it is working properly. After you have completed the setup procedure, you can install the option.
- Provide a flat work surface large enough to hold the system unit and all options you wish to install. Make sure the work area is close to a properly grounded electrical outlet. The outlet should have enough receptacles to allow you to plug in the system unit and any options that require their own power source.
- Three adapter cards are installed in the basic Workmaster: the 3½ inch Diskette Drive Adapter card, the Combination Adapter card, and the Graphics Monitor Adapter card. If these adapter cards are removed during the installation of an option, they must be returned to the same expansion slot from which they were removed.
- The Workmaster has five expansion slots available for installation of option cards. Slots 2, 3, and 4 hold option cards of any length. Slots 6 and 7 hold only shorter option cards. Refer to page 4-29 for definition of slot numbers.
- If you have not done so, read the instructions that came with your option. Follow any instructions, and then return to these procedures.

Tools Required

- Medium-size, flat-blade screwdriver
- 5.5-mm (7/32-in.) open-ended wrench
- 3-mm allen wrench
- Module puller
- Medium screwstarter (optional).

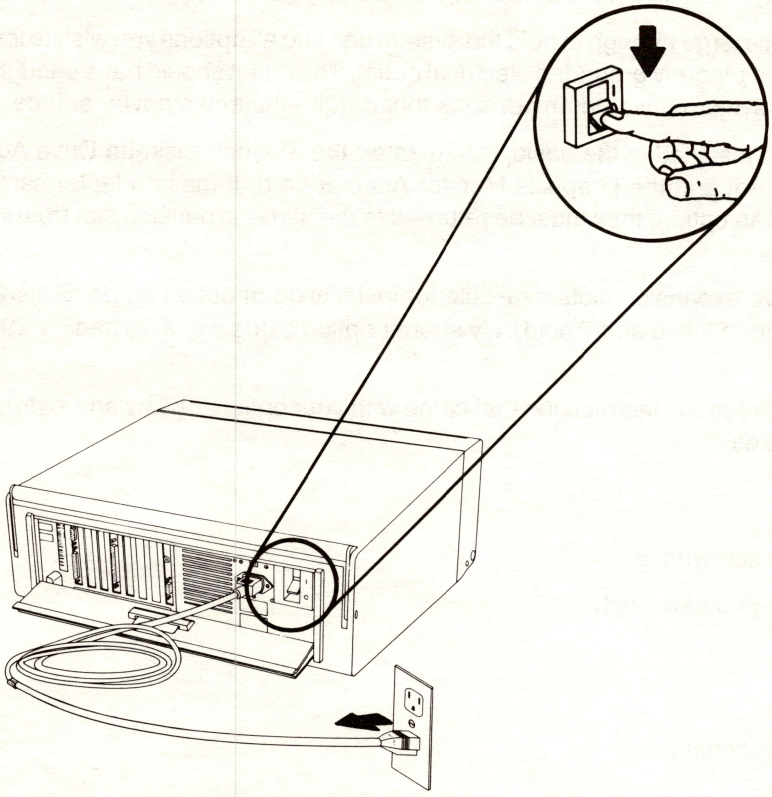
INSTALLATION PROCEDURES

WARNING

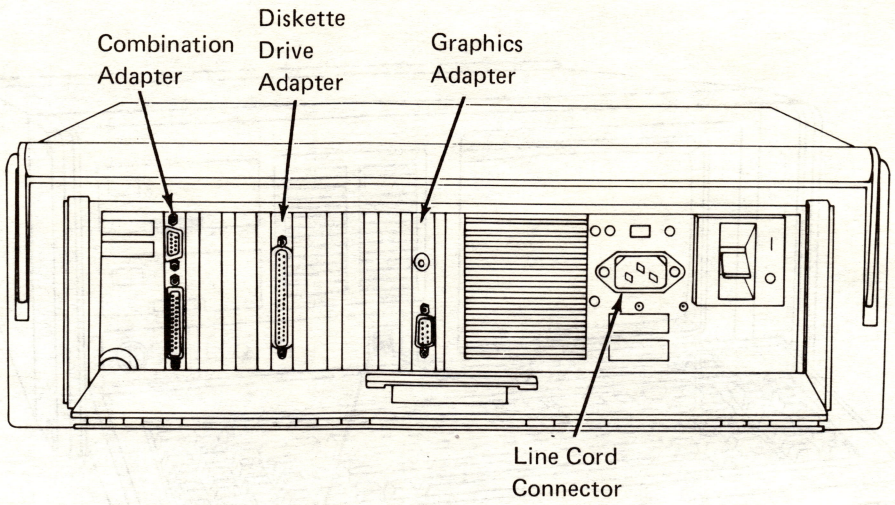
The installation procedures require you to switch off the Workmaster and disconnect it from all external devices. Be aware of the equipment that depends on Workmaster before disconnecting external devices. Take necessary precautions before switching off the power.

Preparing the Workmaster

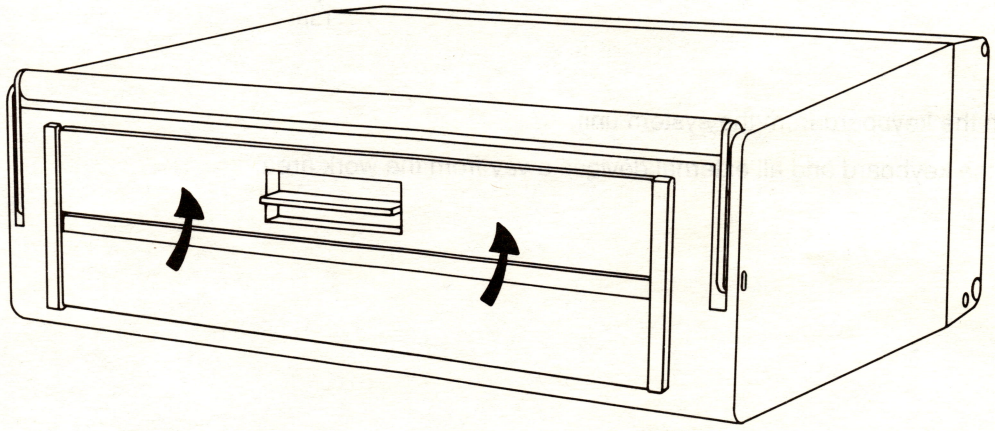
1. Set the system unit's Power switch to Off.
2. Unplug the system unit's power cord from the wall outlet.



3. Place the system unit so that the rear of the unit faces you. Disconnect all cables and the power cord from the rear of the system unit.

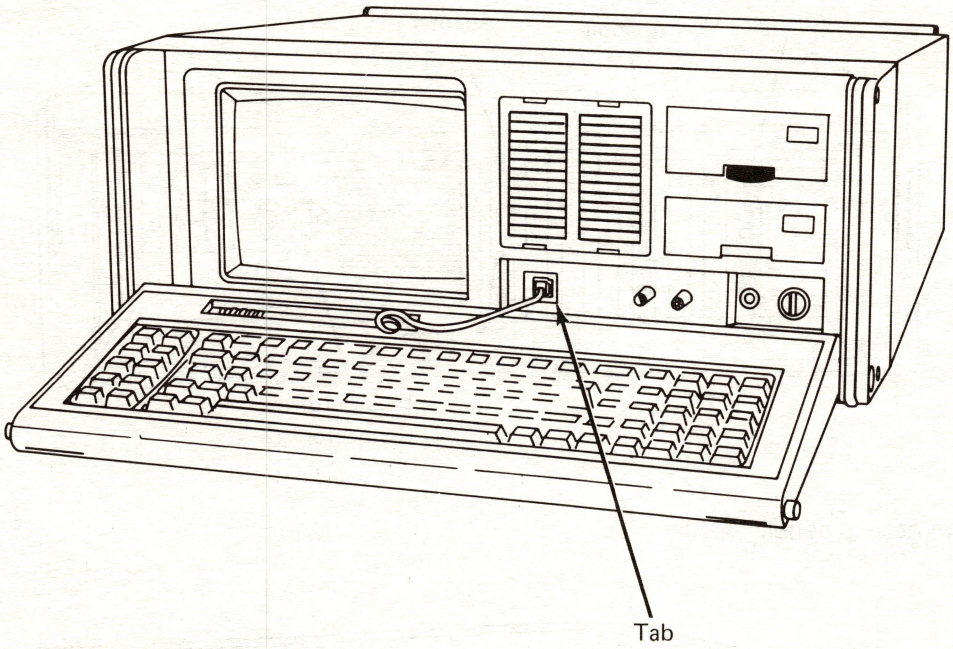


4. Close the system access panel.



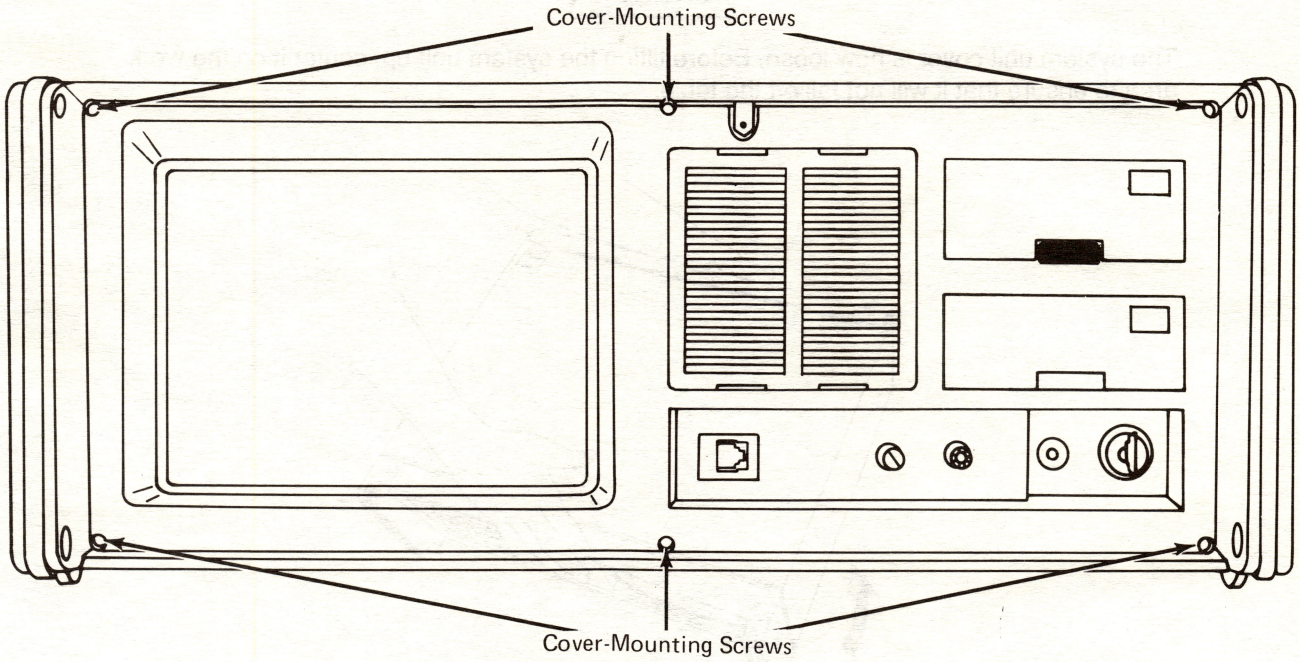
Removing the Cover

1. Place the system unit so that the front of the unit faces you. Disconnect the keyboard cable by pressing the tab on the right side of the keyboard cable connector and pulling the connector straight out as shown below.



2. Detach the keyboard from the system unit.
3. Move the keyboard and all external devices away from the work area.

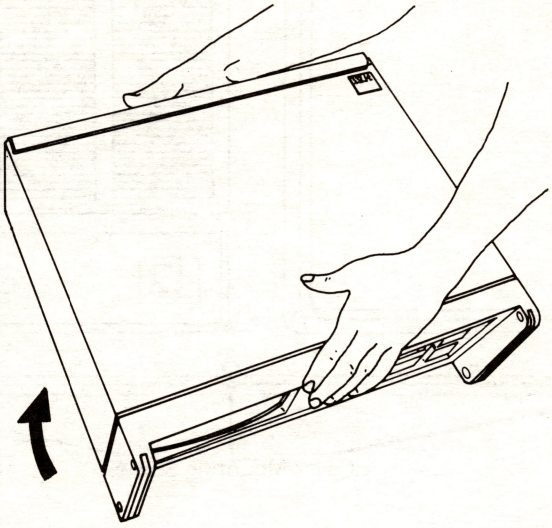
4. Remove the six cover-mounting screws on the front panel of the system unit by turning them counterclockwise with a 3-mm allen wrench. Save the screws for replacing the cover.



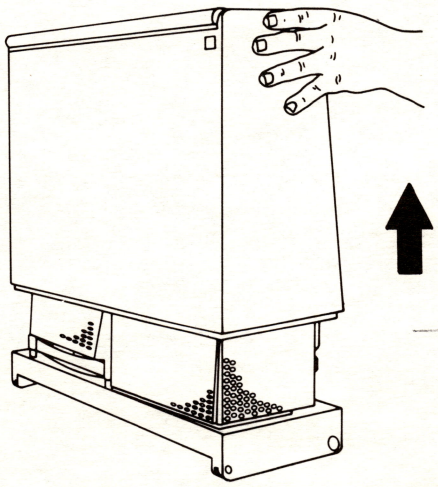
5. Carefully tilt the system unit up so that it rests on its front panel.

CAUTION

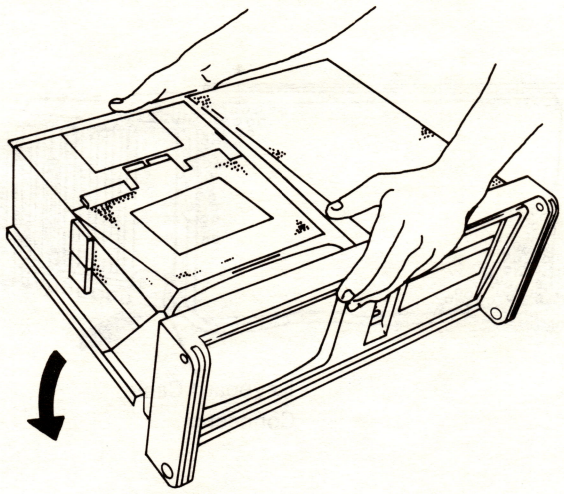
The system unit cover is now loose. Before tilting the system unit up, center it on the work area to ensure that it will not fall off the table.



6. Slide the system-unit cover up until it clears the frame of the system unit. Set the cover aside.

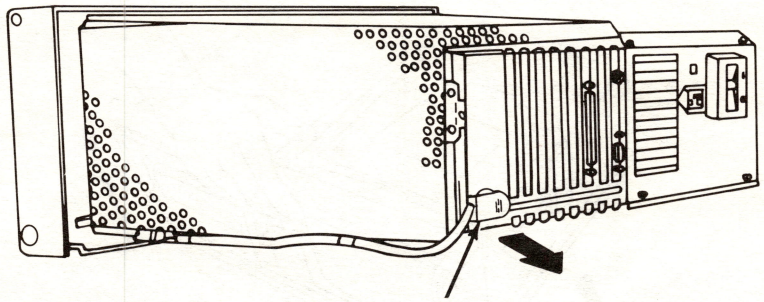


7. Carefully return the system unit to its operating position as shown below.

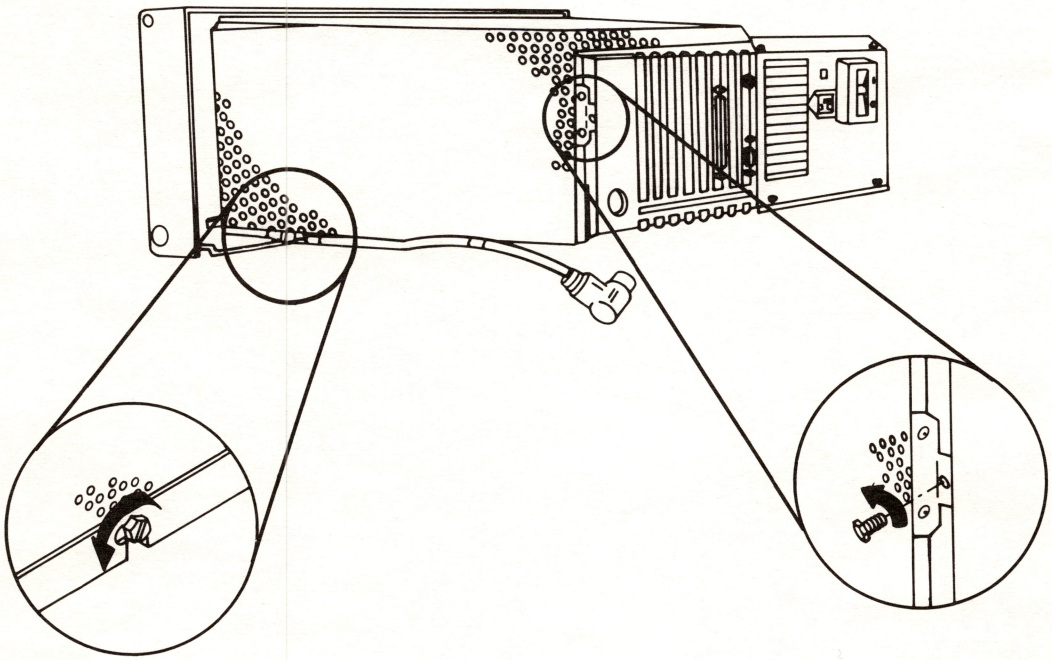


Removing the Adapter Card Retainer

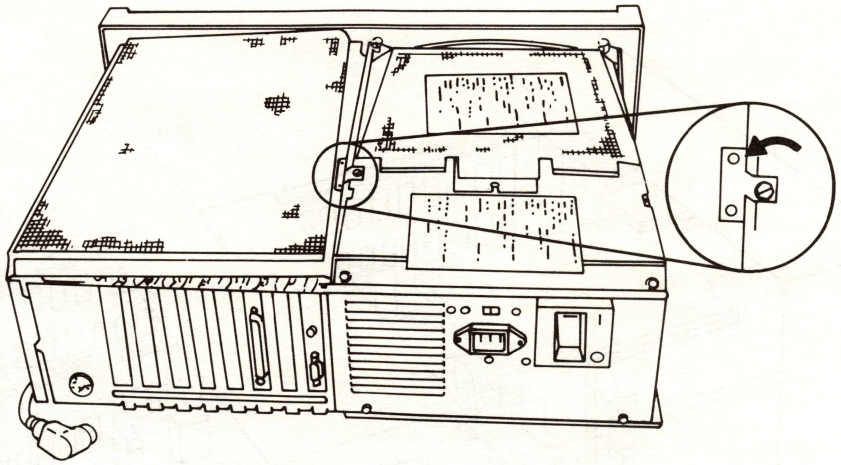
1. Place the system unit so that the right side faces you. Disconnect the internal keyboard-cable connector as shown below.



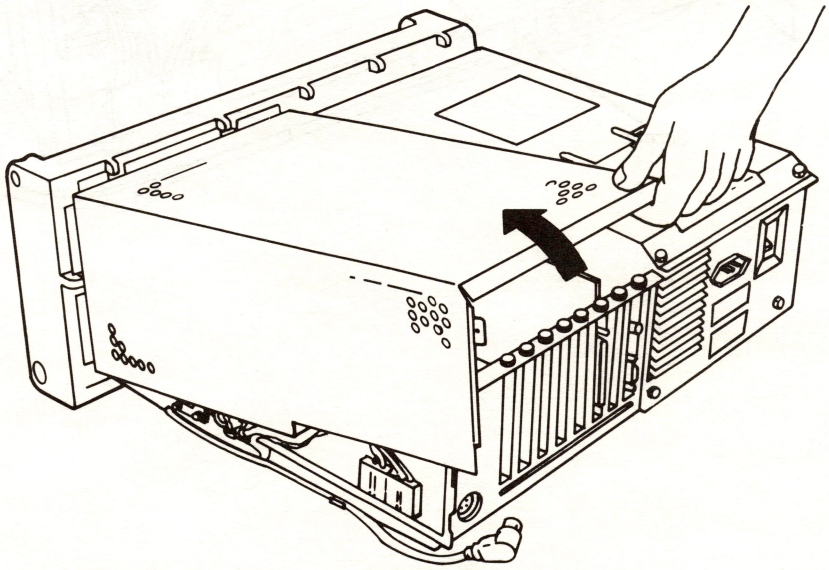
2. Remove the two mounting screws that hold the electromagnetic compatibility (EMC) shield by turning the screws counterclockwise with a flat-blade screwdriver as shown below.



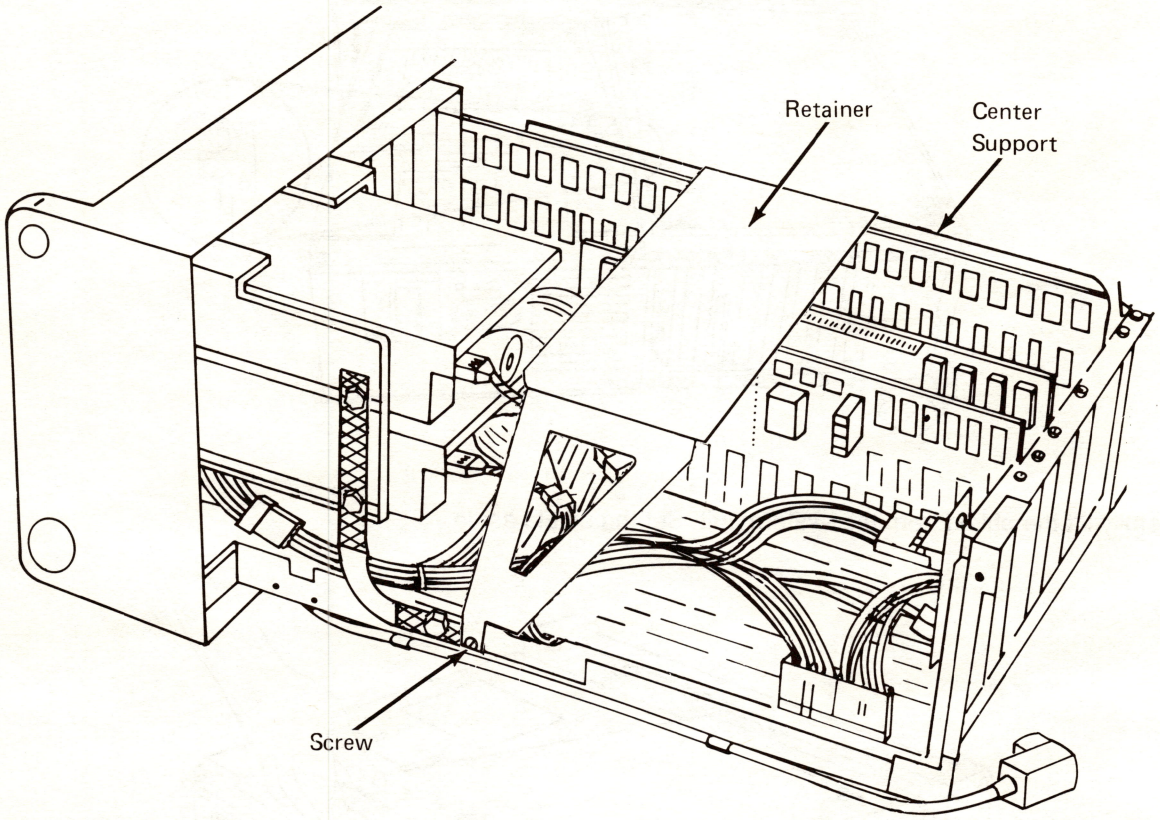
3. Place the system unit so that the rear of the unit faces you. Remove the mounting screw on the shield as shown below.



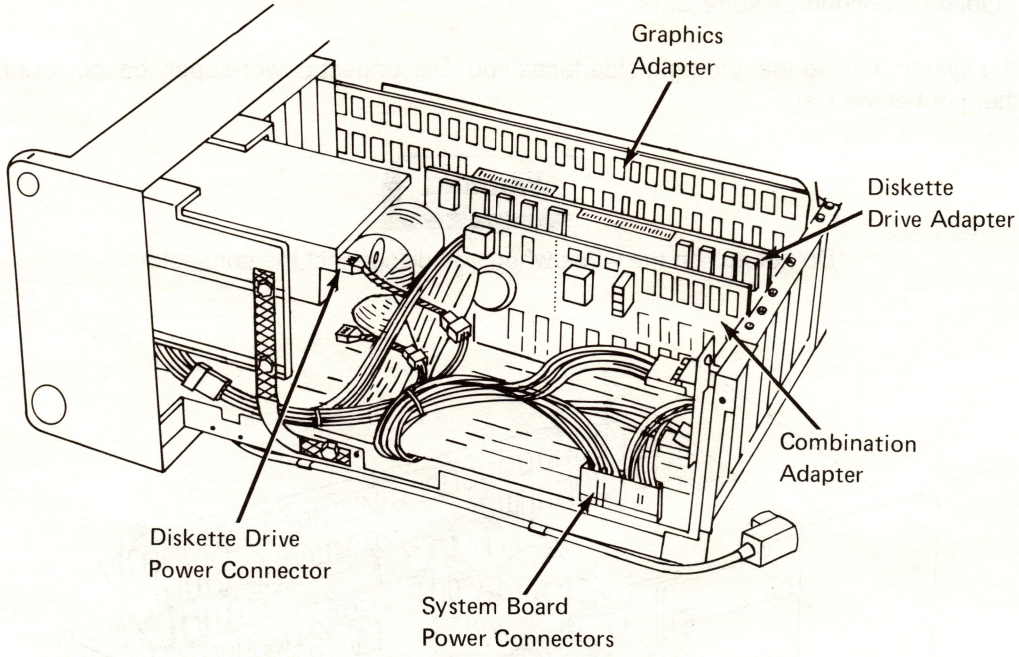
4. Carefully lift the shield from the system unit. Set the shield aside.

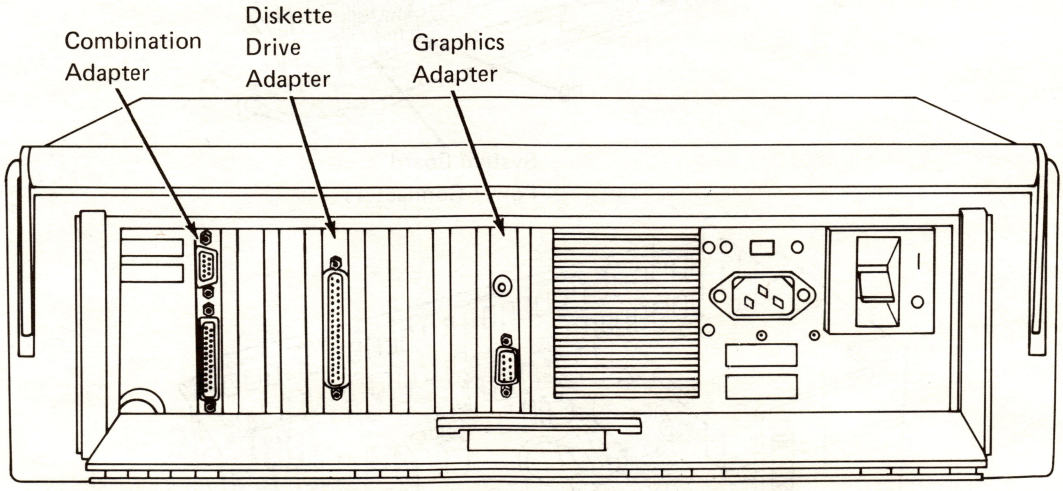


5. Note that the tab on the adapter card retainer hooks under the center support. Observe the retainer's position before removing it. Remove the adapter card retainer by removing one screw at the bottom right (looking from the front). Then, raise the right end, unhook the left end from the center support, and lift the retainer out.



6. Study the figures below. They show you some of the features that are referred to in the following installation procedures.





Installing the Math Coprocessor

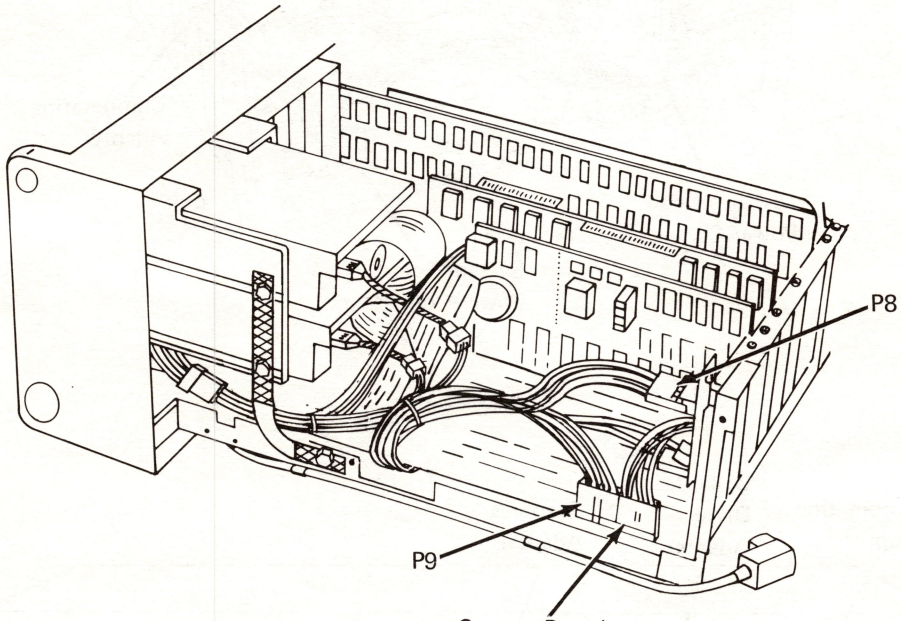
NOTE

If you do not have a Math Coprocessor to install, go to the next section, "Installing the Optional Second Diskette Drive."

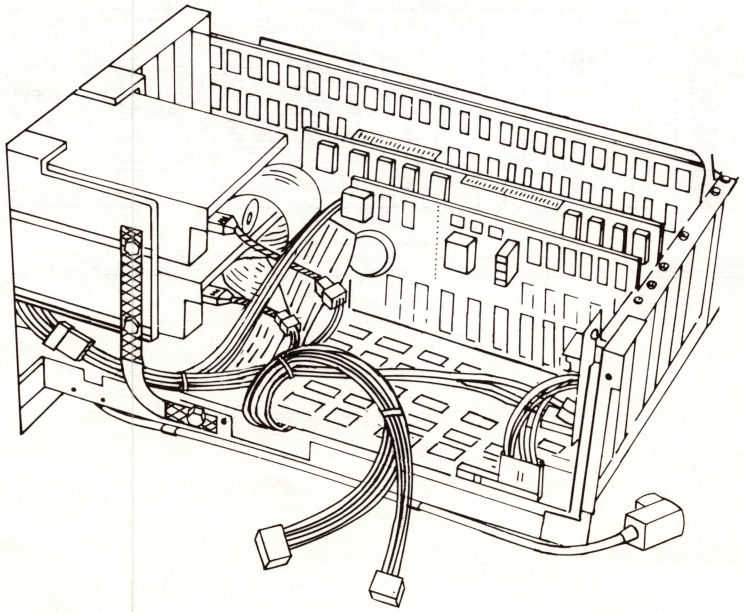
1. Place the system unit so that the right side faces you. Disconnect power-supply connectors P8 and P9, and move them out of the way.

WARNING

Do not pull on the wires when you disconnect the connectors.



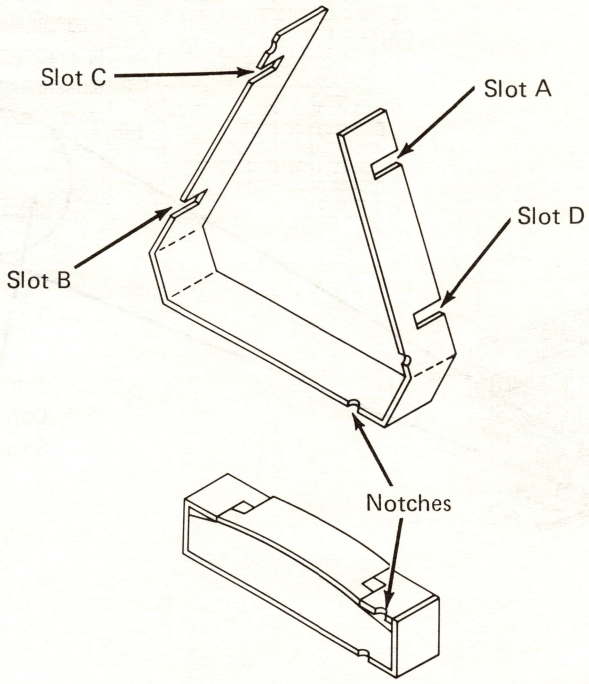
System Board
Power Connectors



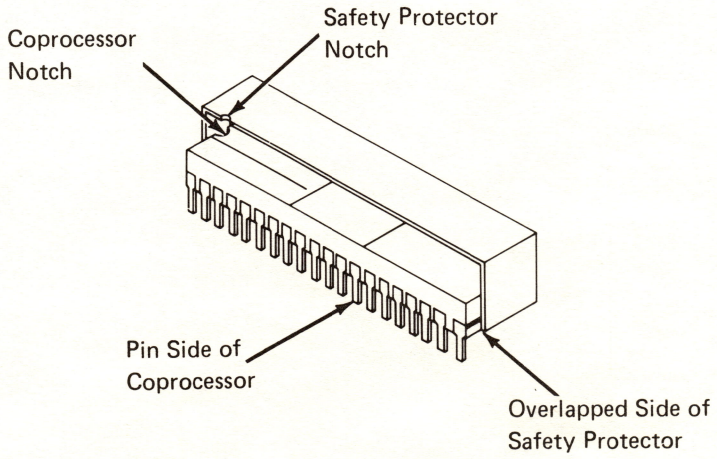
NOTE

Before you install the Math Coprocessor, an optional safety protector may be installed. The Math Coprocessor can be identified by its gold-colored pins.

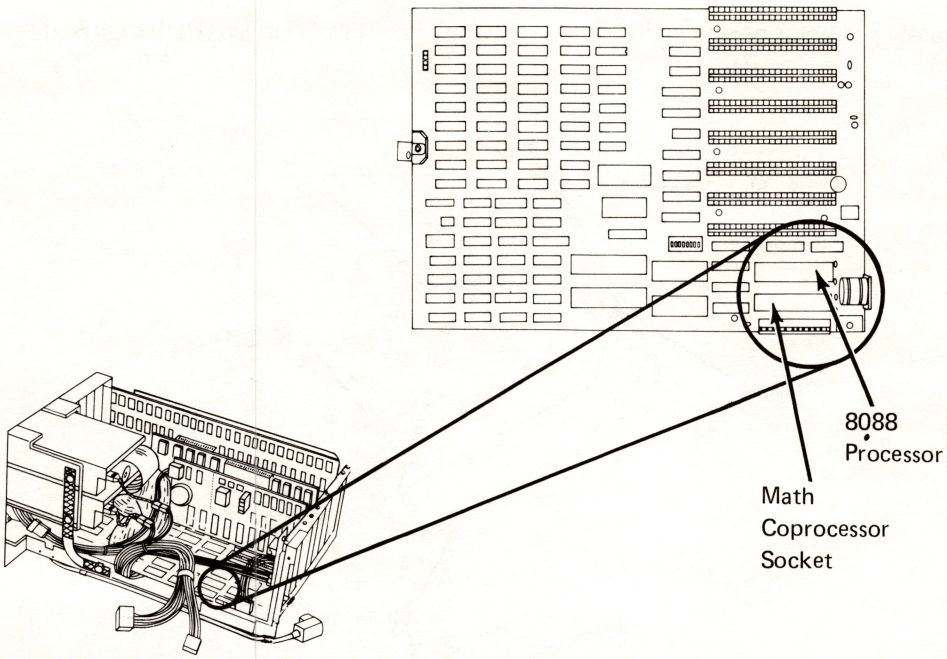
2. Assemble the safety protector as shown in the figure below. Insert slot A in slot B; then, insert slot C in slot D.



3. Install the safety protector on the coprocessor as shown below. Make sure the notch in the safety protector is on the same end as the notch in the coprocessor. The overlapped portions of the safety protector should be on the bottom, or pin side, of the coprocessor.



4. Study the figure below and become familiar with the system board. Note the location of the coprocessor socket on the system board as shown below.

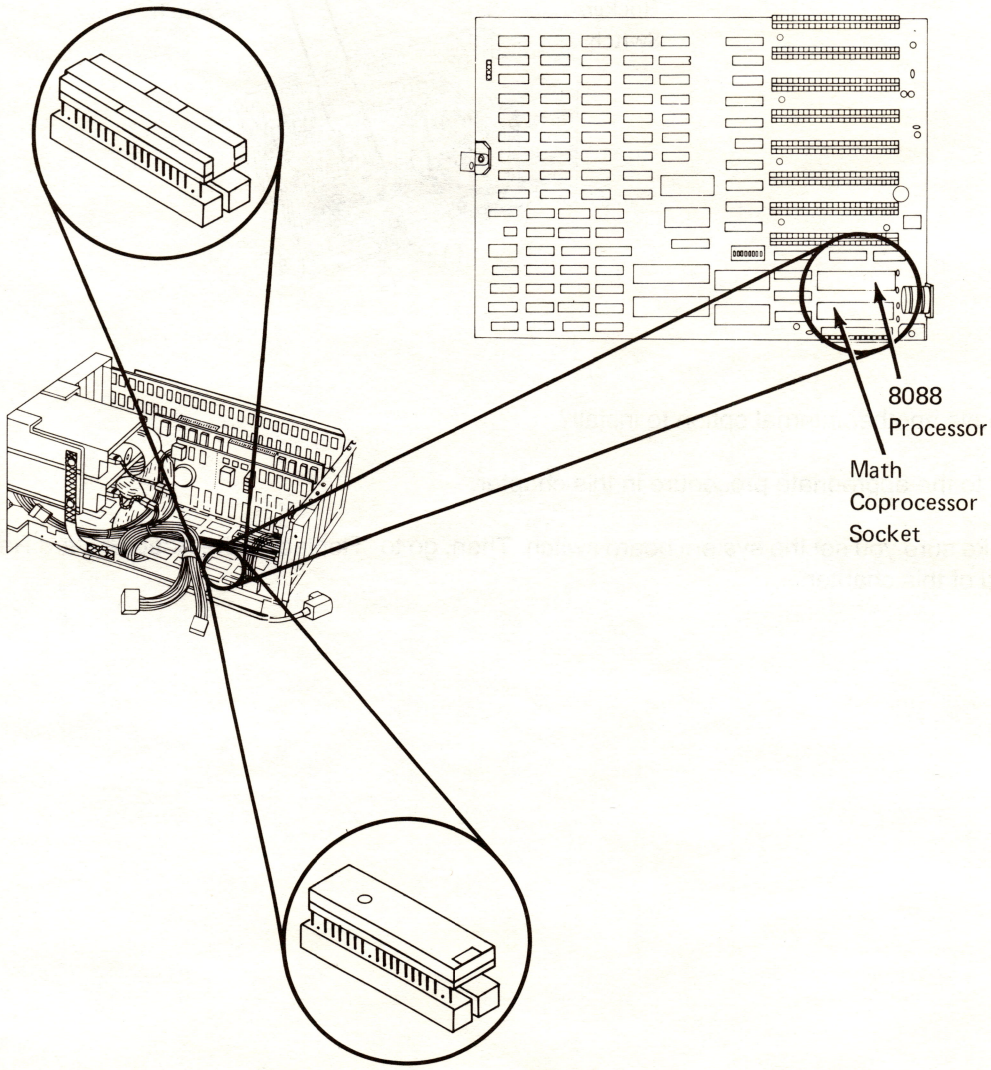


5. Compare your coprocessor with the one in the figure below. Find the notch in your coprocessor safety protector shown in the figure. This notch must face the 8088 Processor and be toward the rear of the system board. If not, the safety protector was not assembled correctly. Get another safety protector and go back to Step 1.

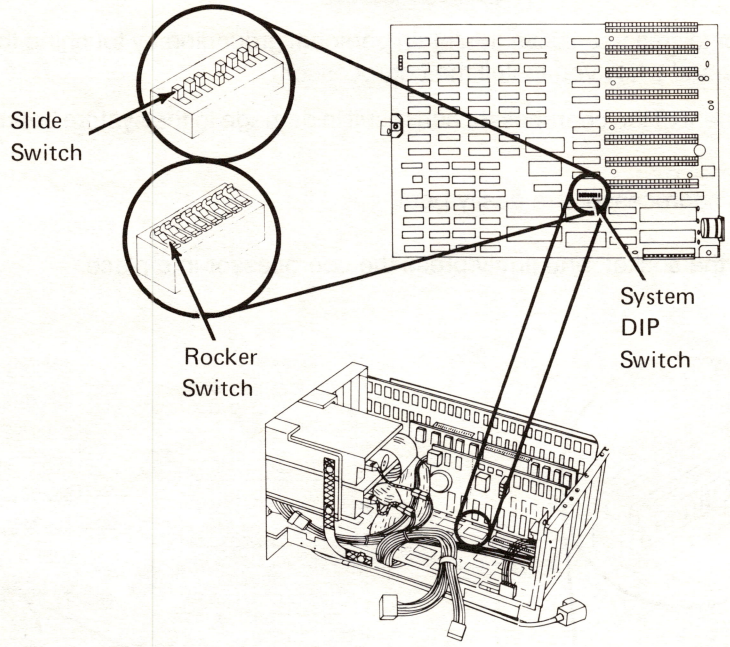
WARNING

- The coprocessor is static-sensitive. Maintain personal grounding by touching the system frame with one hand while you install the coprocessor.
- Incorrect placement of the coprocessor can result in damage to the system board or to the coprocessor.
- The pins on the coprocessor are easily bent.

6. Carefully align the pins to the socket, and firmly press the coprocessor into place.



7. You must set a system board switch to reflect the installation of the Math Coprocessor. Study the figure below. There are one of two types of switch blocks on the system board: the rocker switch block or the slide switch block. Identify the type of switches on your system board. Set Switch 2 to the Off position. Refer to "Math Coprocessor" under "Setting Switches to Reflect Options" in this chapter.



Do you have another internal option to install?

YES Go to the appropriate procedure in this chapter.

NO Make sure you set the system board switch. Then, go to "Replacing the Adapter Card Retainer" toward the end of this chapter.

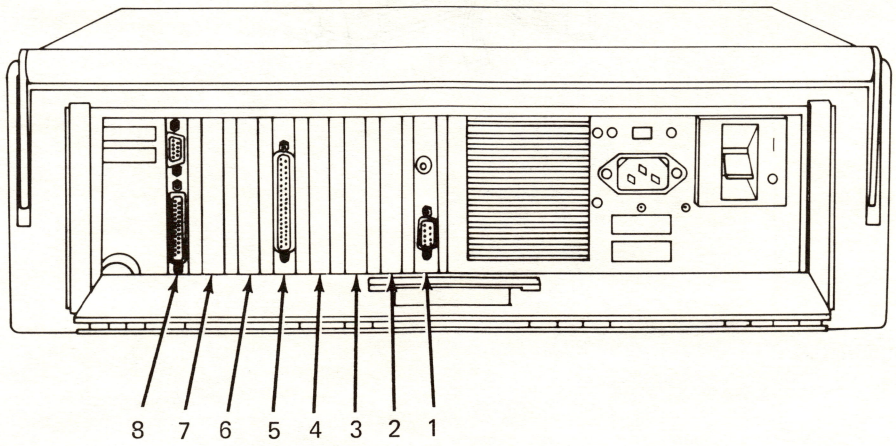
Installing the Optional Second Diskette Drive

The first part of this section instructs you to remove adapter cards. You must remove the cards to avoid damaging the diskette drive or the cards themselves.

Depending on the tool you use, you may not need to remove the cards in slots 1 through 4. Make sure you have enough tool clearance to prevent damaging any installed cards. Remove any cards that are likely to be damaged.

Refer to the following figure for locations of the adapter cards.

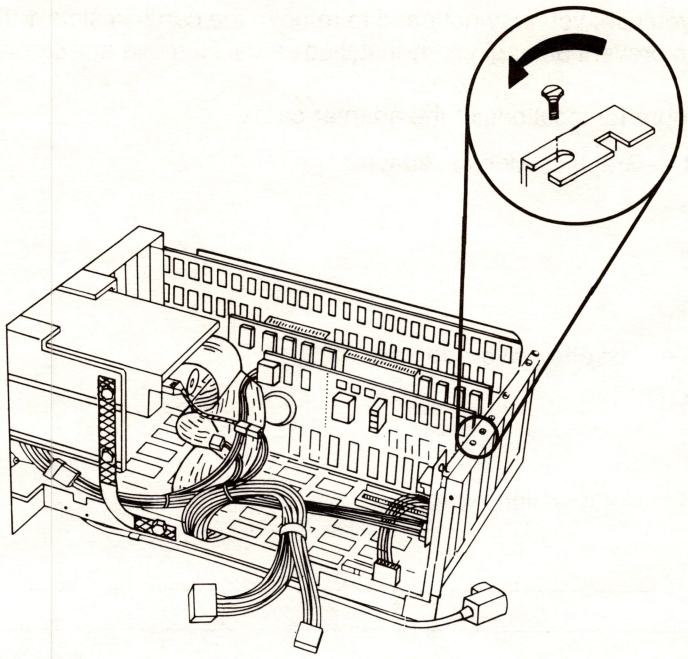
- Expansion slot 1 — Graphics Monitor Adapter
- Expansion slot 2
- Expansion slot 3
- Expansion slot 4
- Expansion slot 5 — Diskette Drive Adapter
- Expansion slot 6
- Expansion slot 7
- Expansion slot 8 — Combination Adapter



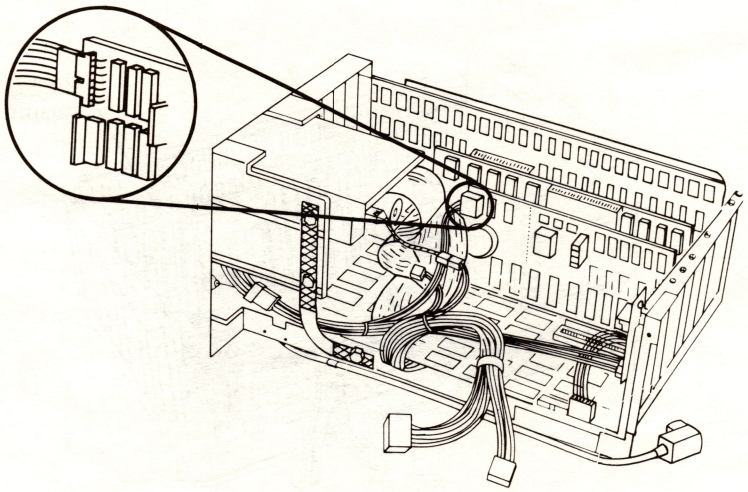
Expansion Slots

Refer to IBM Technical Reference Manual (IBM 5531 Technical Reference, Vol. 1-3, No. 6219639) for information on connecting an external disk drive to the connector provided and shown in slot 5 (see above figure).

1. Place the system unit so that the rear of the unit faces you. Use a flat-blade screwdriver to remove the screws that hold the adapter-retaining brackets on all adapter cards.



2. Remove the connector from the front top of the Combination Adapter card in slot 8.

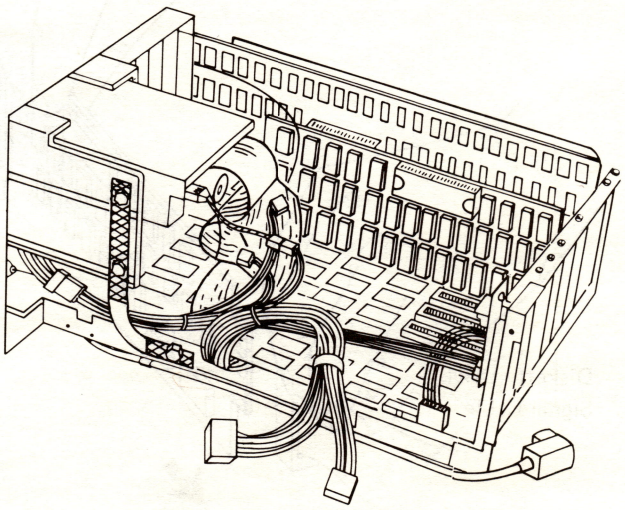


3. Grasp the Combination Adapter card by the top corners, and pull straight up until the card is loose from the expansion slot. Set the card aside.

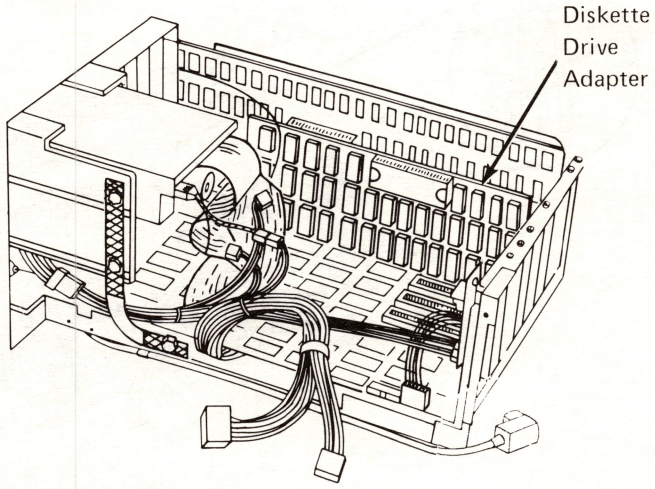
NOTE

Avoid setting the Combination Adapter card on a conductive surface as this could short circuit the battery.

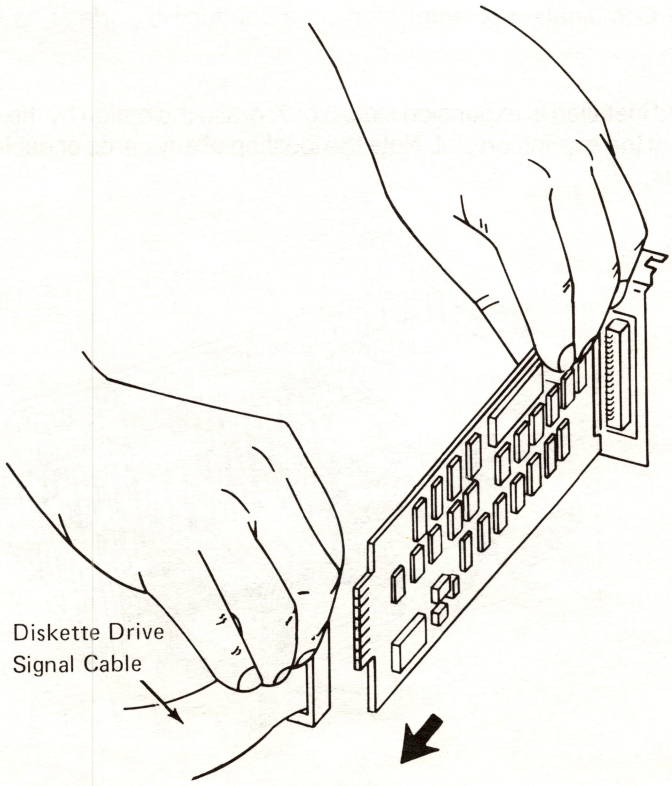
4. If you have an option card installed in expansion slots 6 or 7, grasp the option by the top corners, pull straight up until the card is loose from the expansion slot. Note the location of any cards or cables before you detach them. Set the option card aside.



5. Grasp the Diskette Drive Adapter in expansion slot 5 by the top corners, and pull straight up until the adapter is loose from the expansion slot.



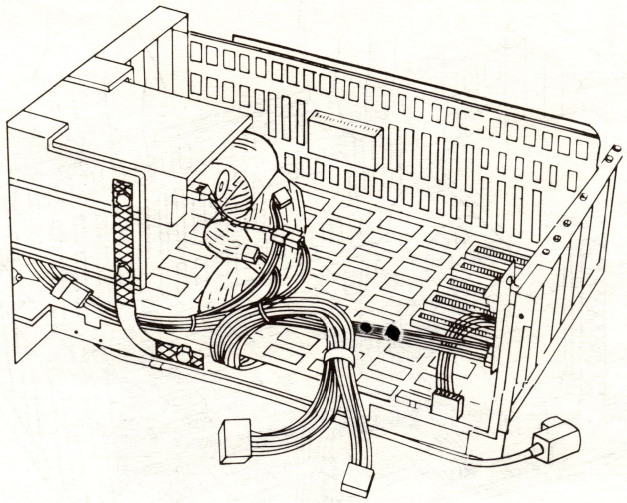
6. Disconnect the diskette-drive signal cable from the adapter. Set the Diskette Drive Adapter aside.



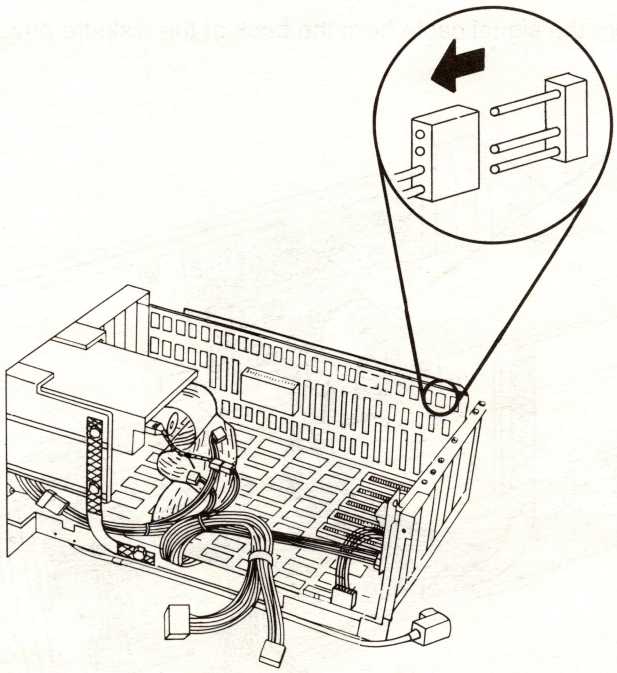
7. If you have an option card installed in expansion slots 2 through 4, grasp the card by the top corners, and pull straight up until the adapter card is loose from the expansion slot. Note the location of any attached cards and cables before you detach them. Set the adapter card aside.

NOTE

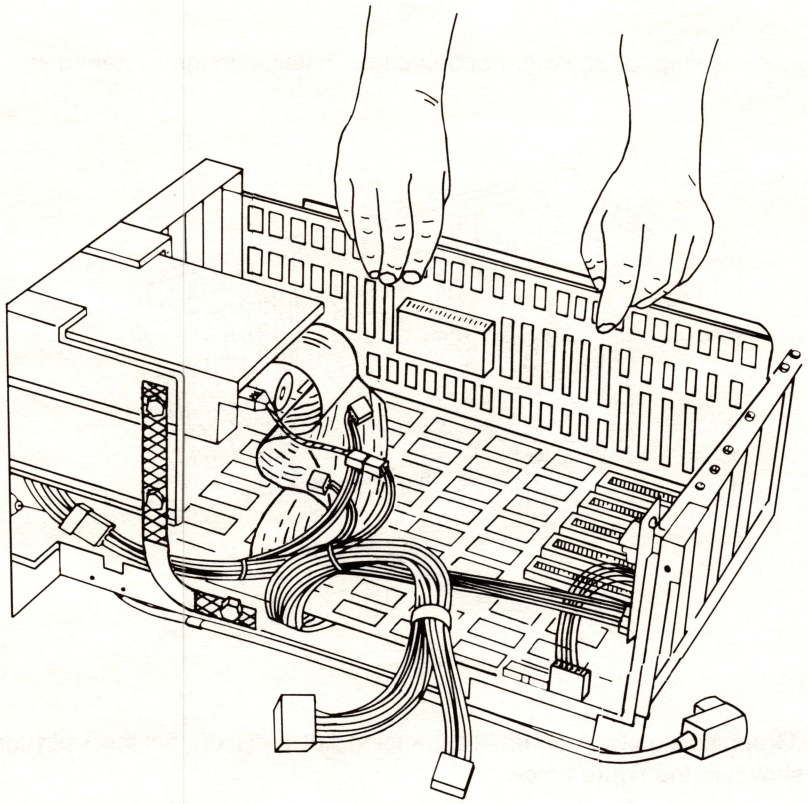
Repeat this step for any other option cards installed in the system unit.



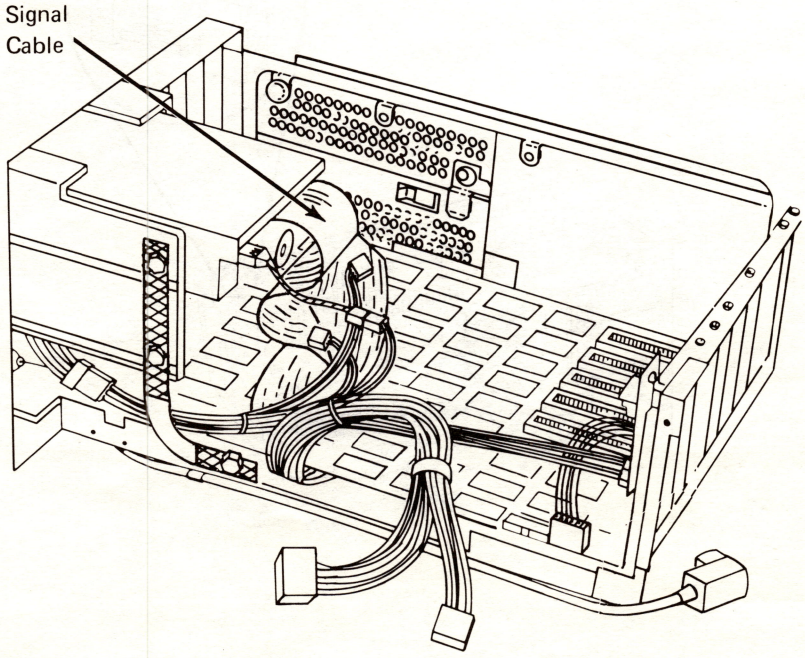
8. Before removing the Graphics Monitor Adapter in expansion slot 1, disconnect the 3-pin connector that comes from the display as shown in the figure below.



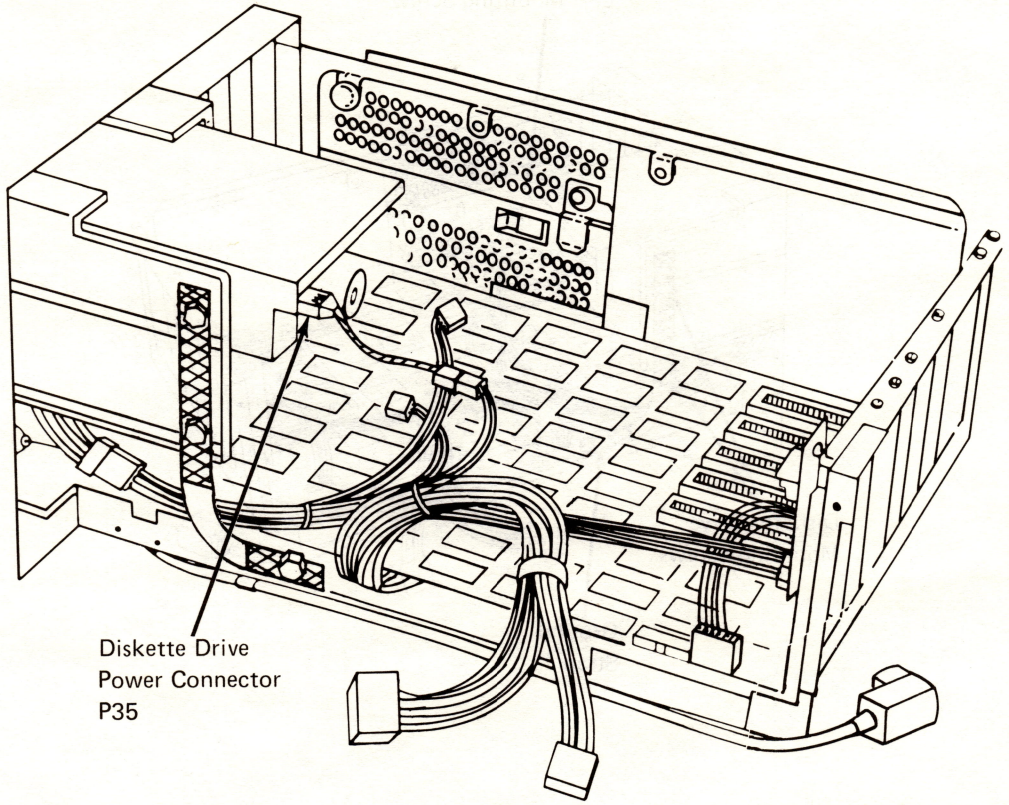
9. Grasp the Graphics Monitor Adapter by the top corners, and pull straight up until the adapter card is loose from the expansion slot. Set the adapter card aside.



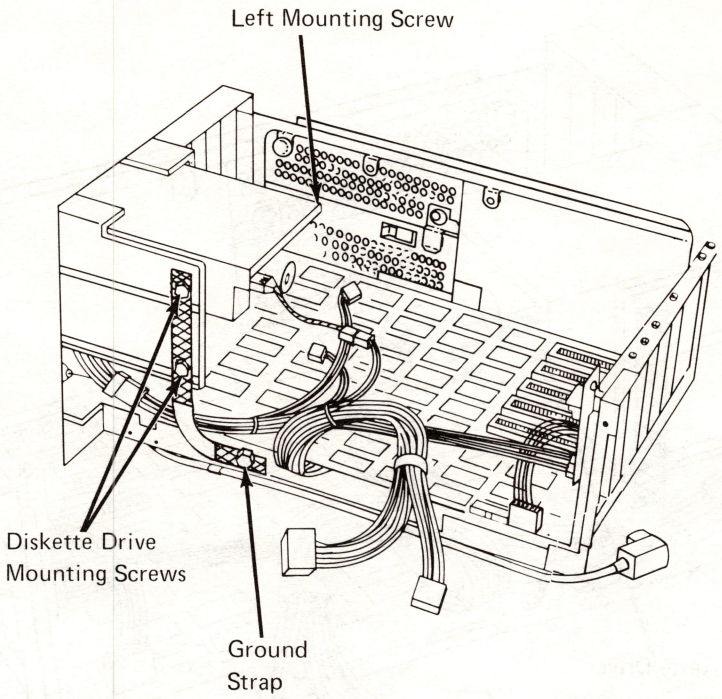
10. Disconnect and remove the signal cable from the back of the diskette drive. Set this cable aside.



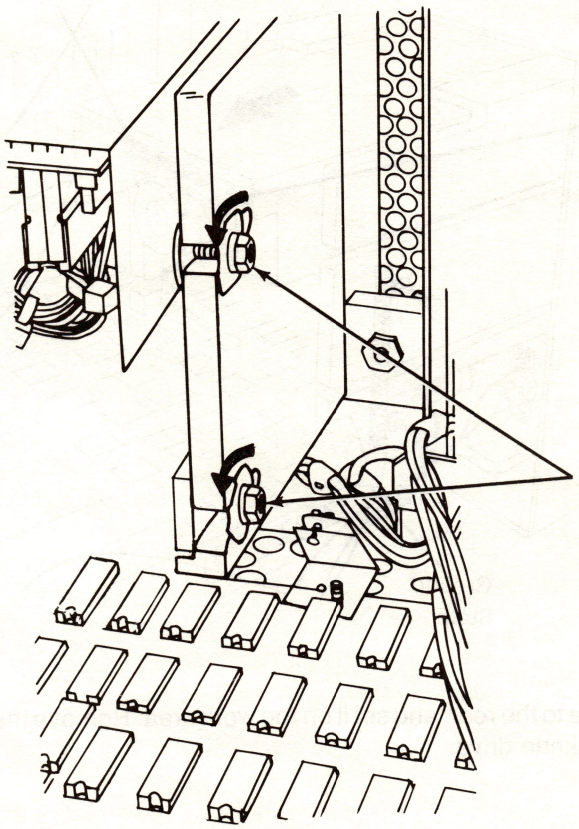
11. Disconnect diskette drive power connector P35 from the diskette drive.



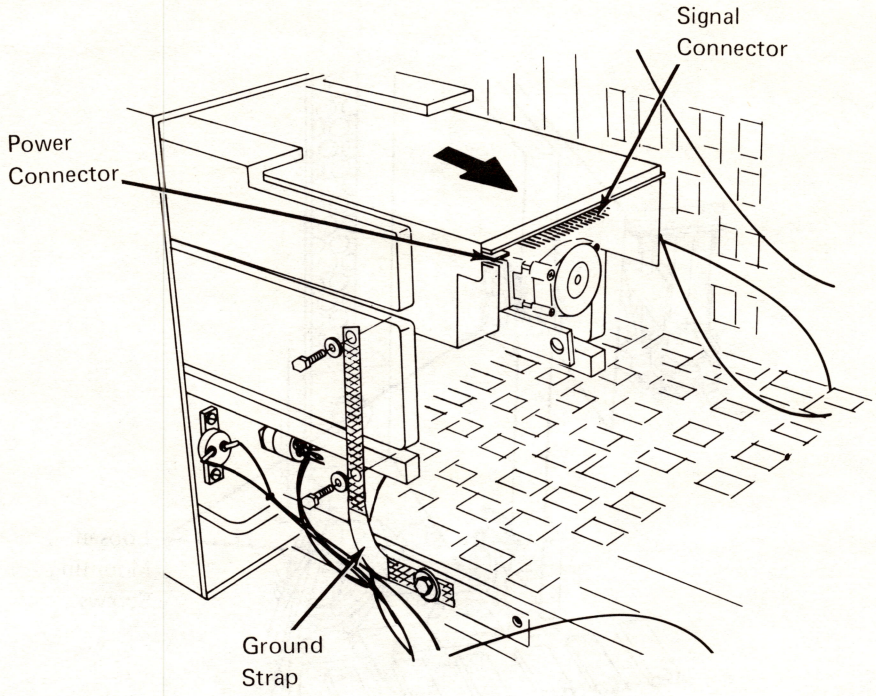
12. Remove the diskette-drive and the front panel face plate mounting screws on the grounding strap.



13. Place the system unit so that the rear of the unit faces you. Loosen the diskette drive and the front panel face plate mounting screws on the right side (do not remove the screw from the threaded screw hole of the diskette drive.)



14. Slide the diskette drive out of its mounting bracket by sliding it to the rear. Set the diskette drive aside.

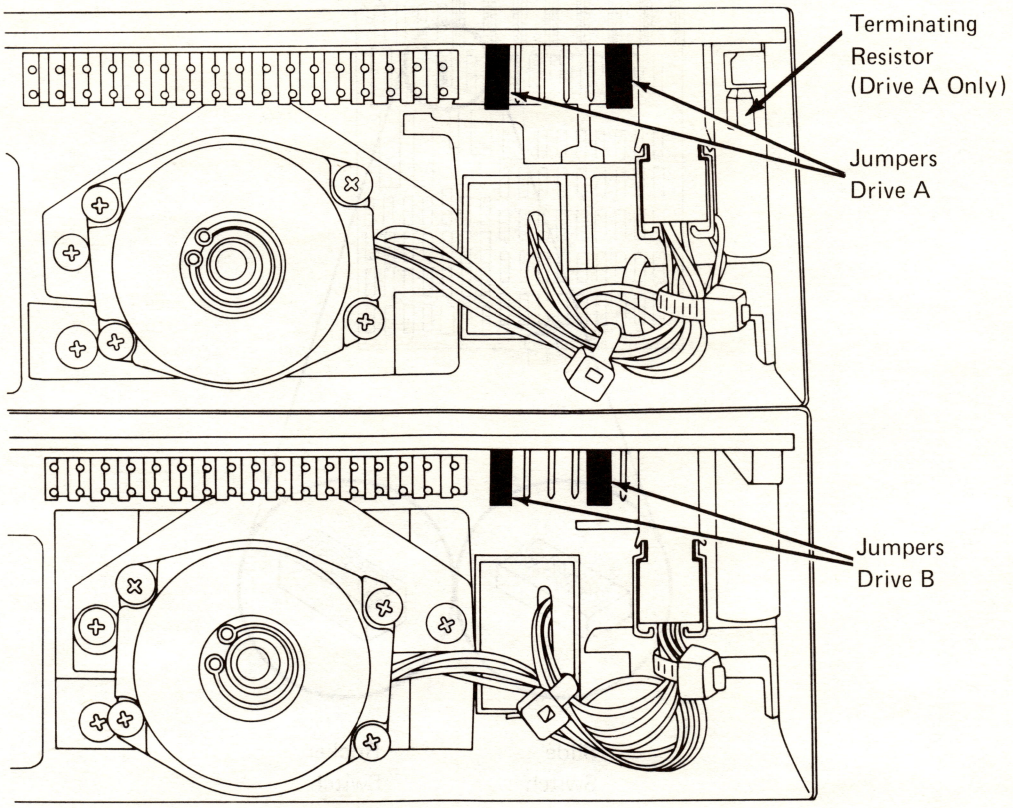


15. Slide the front panel face plate to the rear, and set it on the work area. Remove the mounting screw and save for installation of the second diskette drive.

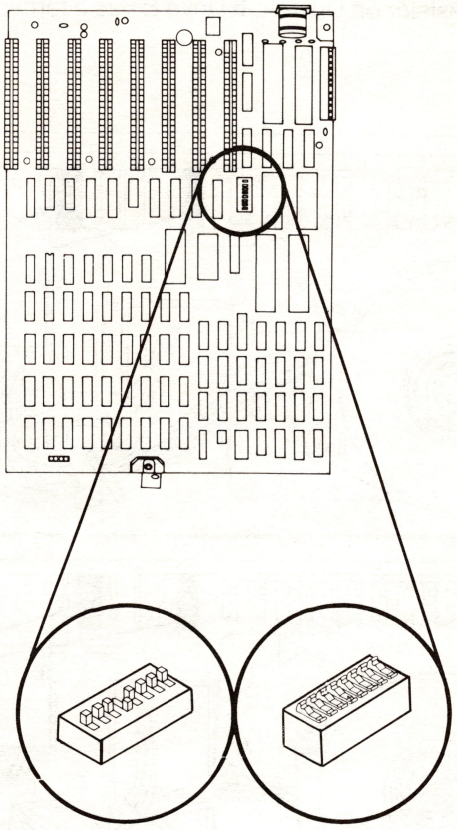
16. Study the figure below and note the location of the drive-select jumpers. Make sure that the jumpers on your drives match those in the figure.

NOTE

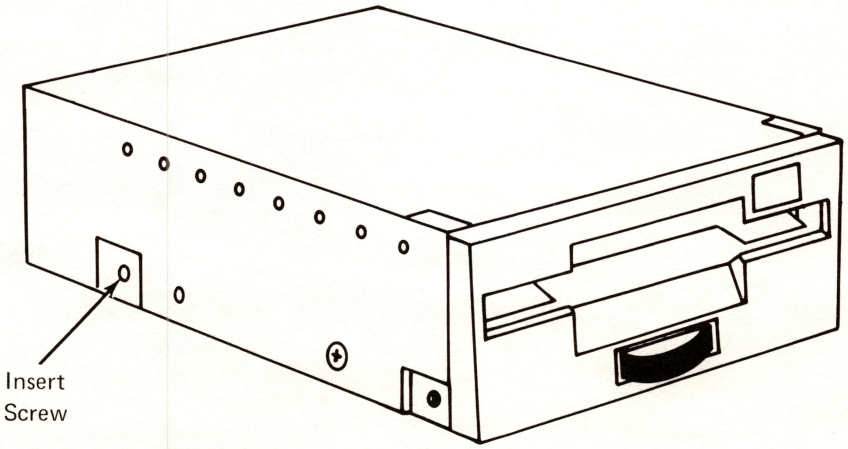
Refer to the terminating resistor on Drive A. If Drive B has a terminating resistor, the resistor must be removed.



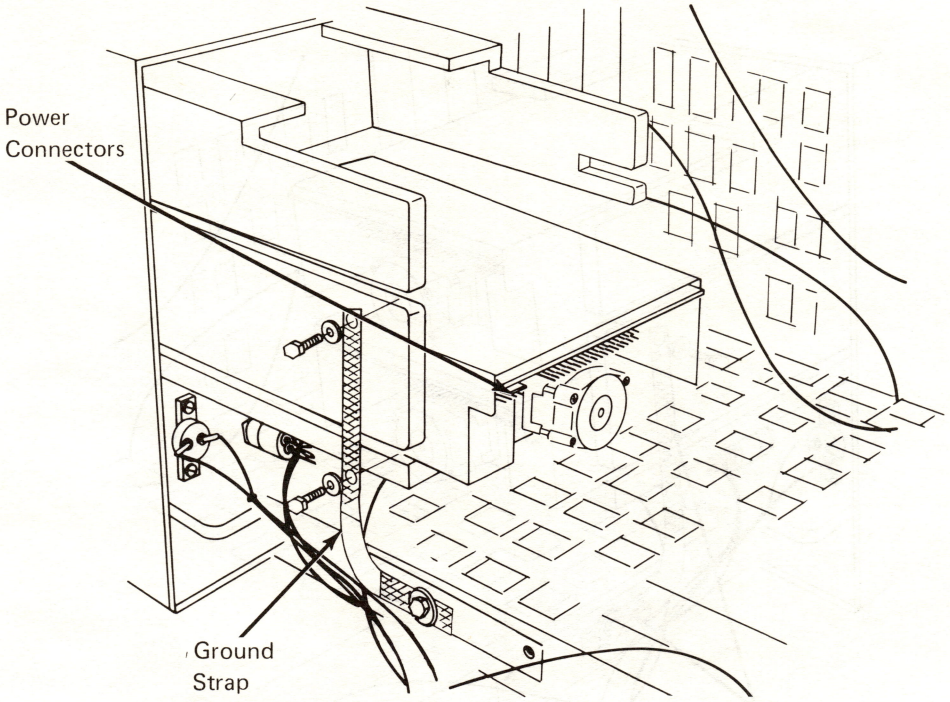
17. You must set a system board switch to reflect the installation of the second diskette drive. Study the figure below. The switch block can be either a slide switch or a rocker switch. Set Switch 7 to the Off position. Refer to "Diskette Drive(s)" under "Setting Switches to Reflect Options" in this chapter.



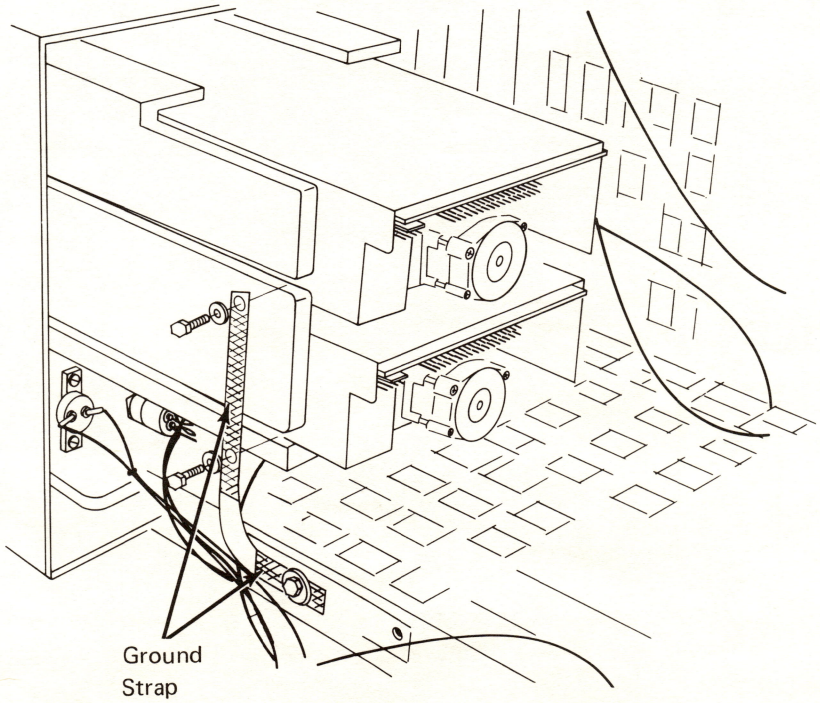
18. Set the second diskette drive on a flat surface. Install one of the two mounting screws just removed from the front-panel face plate in the threaded screw hole on the left side of the drive.



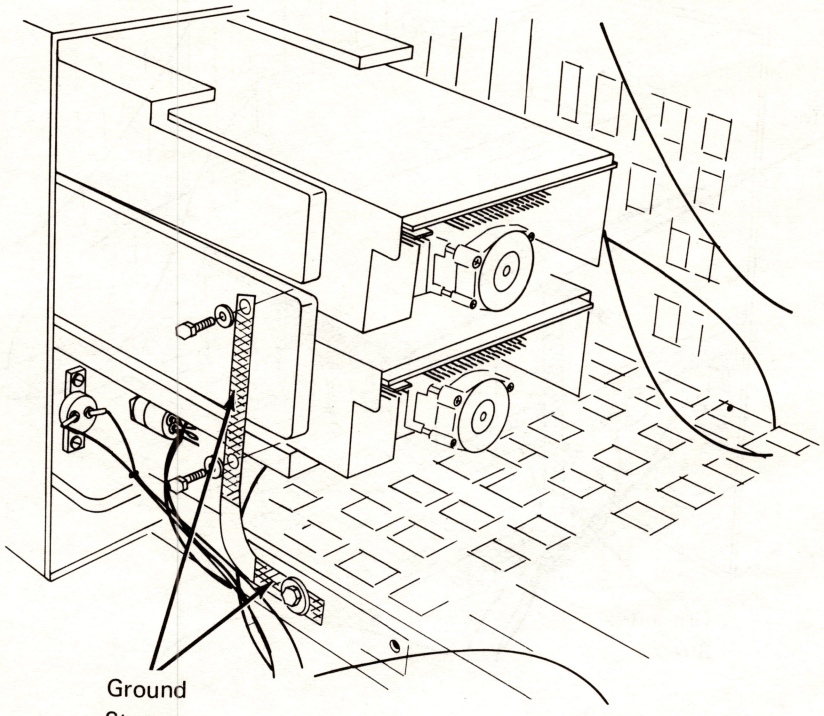
19. Install the new diskette drive (drive B) by sliding it into the lower mounting brackets as shown below.



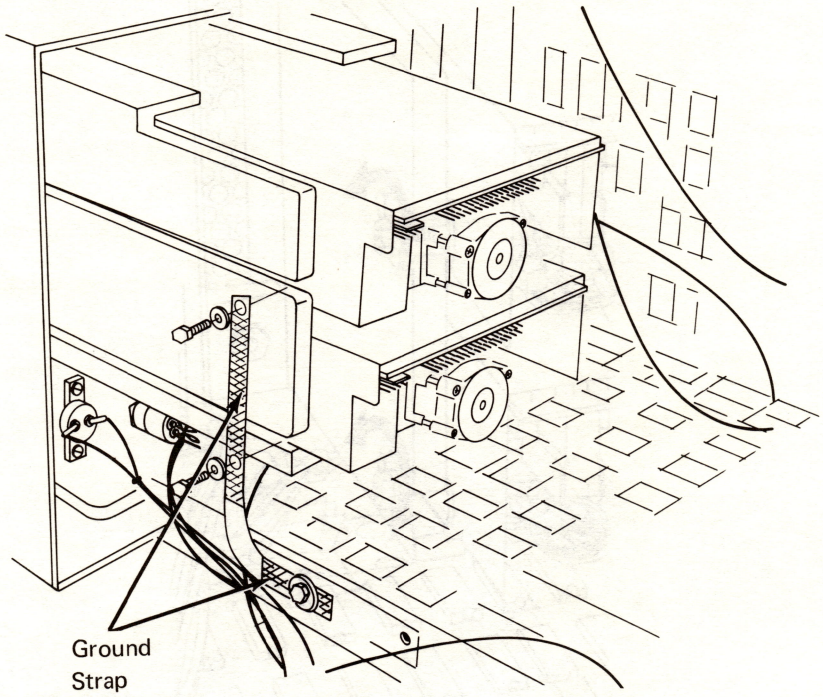
20. Install the top diskette drive (drive A) by sliding it into the top mounting brackets as shown below.



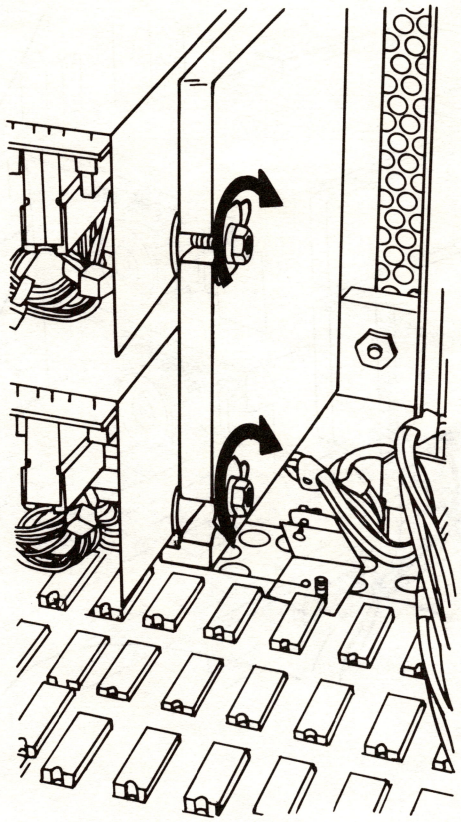
21. Position the ground strap over the mounting holes, and insert the mounting screws through the strap. Do not tighten.



22. Align the diskette drives so that they are flush (tight against) with the front panel. Tighten the diskette-drive mounting screws on the left side.



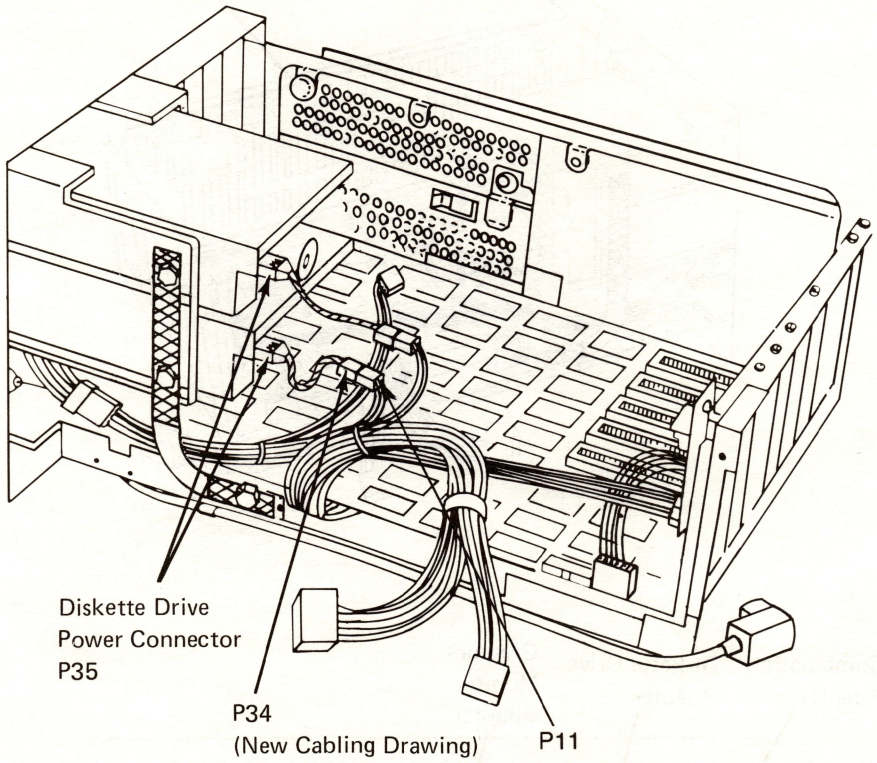
23. Place the system unit so that the rear of the unit faces you. Tighten the screws mounted on the right side of the diskette drives.



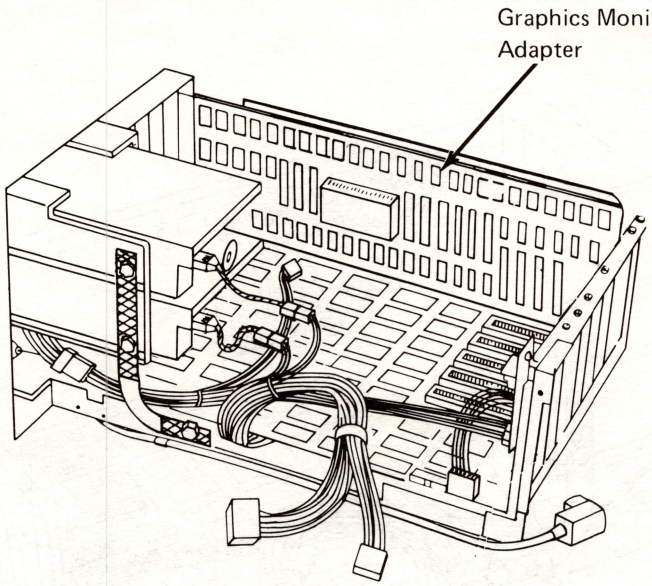
24. A second power adapter cable is supplied with the optional diskette drive. Connect the power adapter cable connector P34 to P11. Then, connect P35 to Drive B power connector.

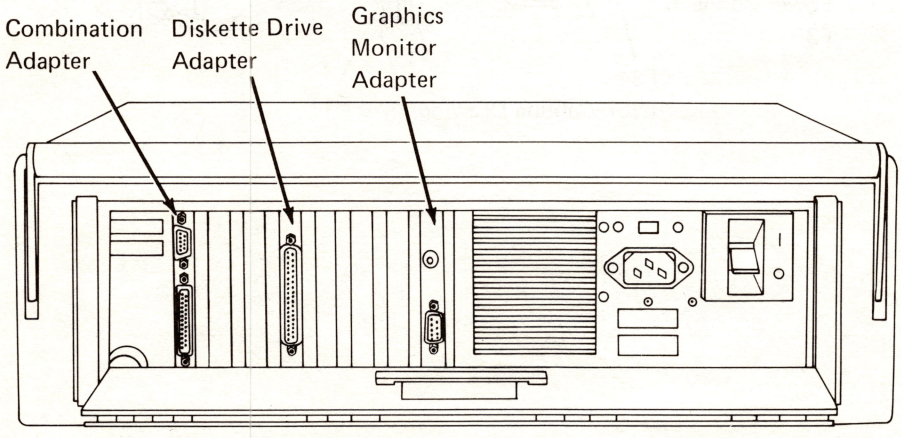
NOTE

The diskette drive power connectors can be connected to either drive.

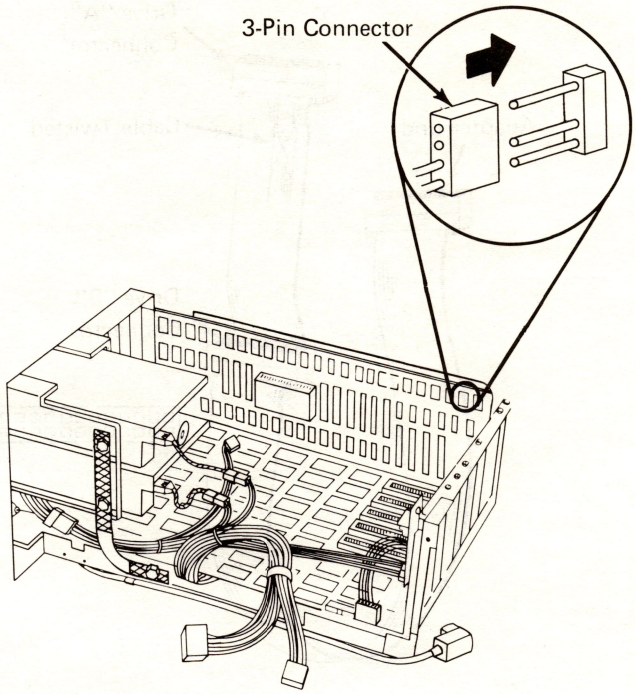


25. Install the Graphics Monitor Adapter by holding the top corners and firmly pressing the adapter card into expansion slot 1. Make sure the front of the adapter card is seated in the card holder at the front panel. Note slot positions in the figure below showing the rear view of the system unit.



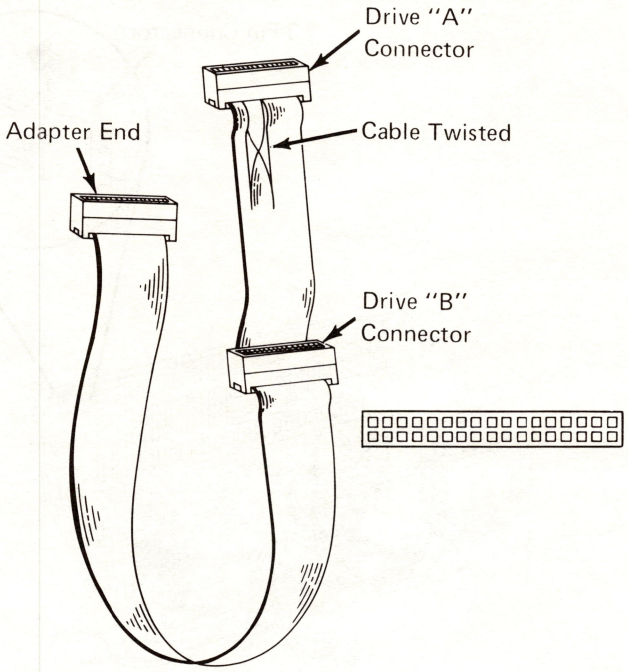


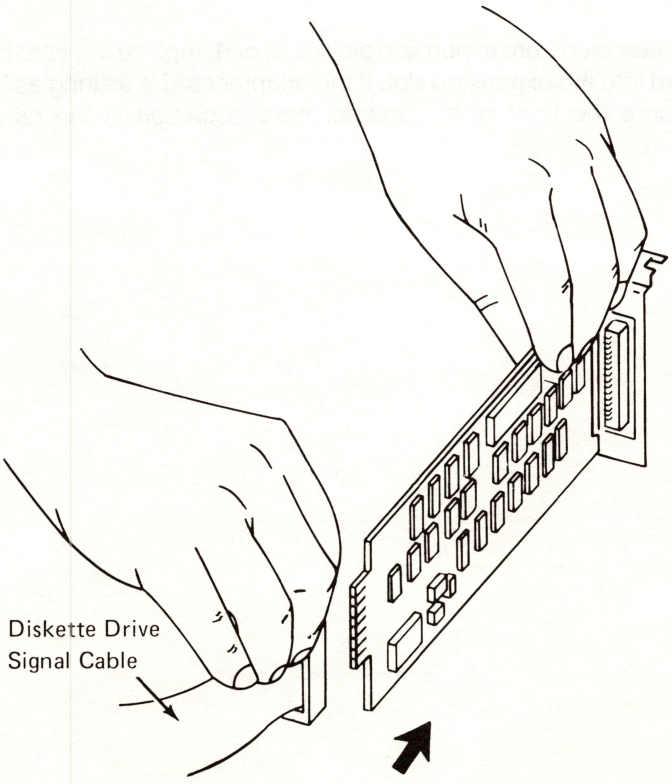
26. Connect the 3-pin connector from the display cable to the three pins at the rear of the adapter as shown below.



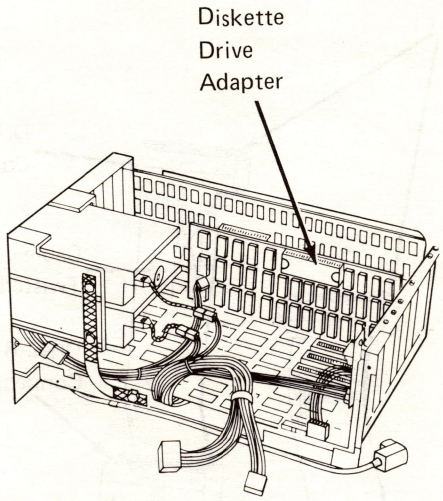
27. If you removed an adapter card from expansion slots 2, 3, or 4, replace the card by holding the top corners and firmly pressing the card into the expansion slot. If the adapter card is as long as the Graphics Monitor Adapter just installed, make sure the front of the adapter card is seated in the card holder. Attach any cables disconnected in Step 7.

28. Connect the diskette-drive signal cable to the front end of the Diskette Drive Adapter as shown below.

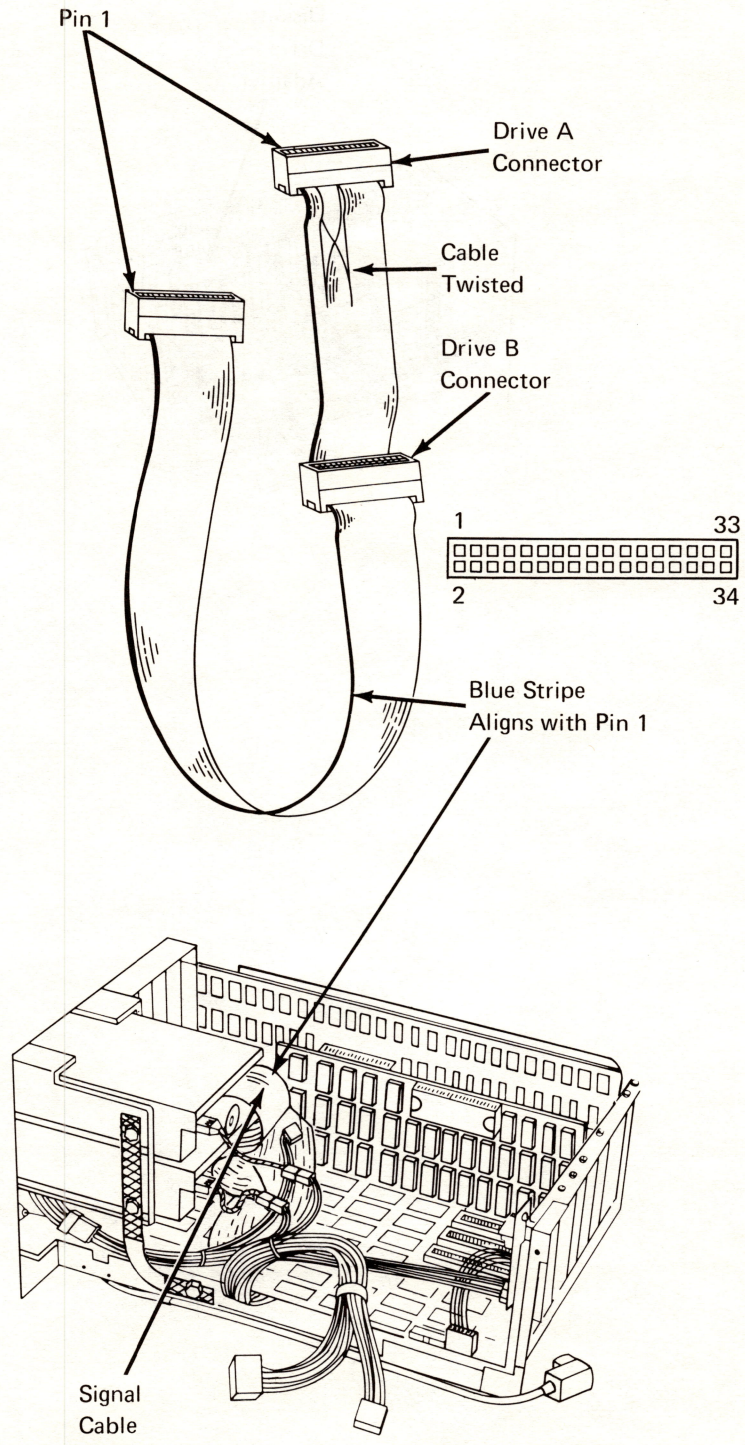




29. Install the Diskette Drive Adapter in the system unit by holding the top corners and firmly pressing the card into expansion slot 5.



30. Connect the signal-cable connector with two groups of wires on the bottom diskette drive. Then, connect the remaining connector to the top diskette drive as shown below.

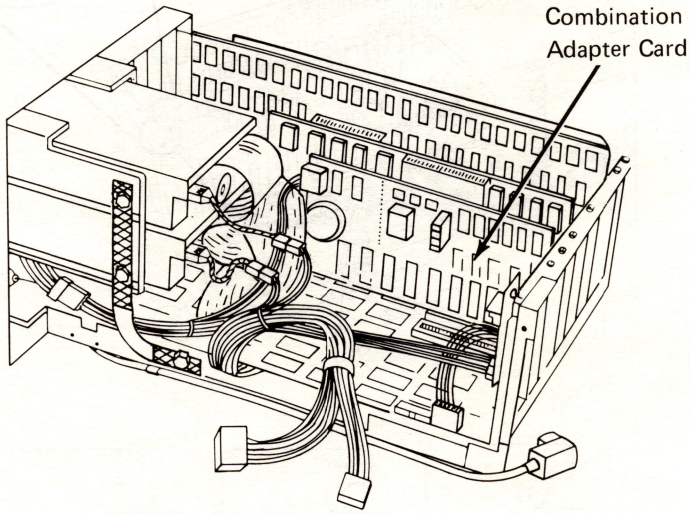


31. If you removed an option card from expansion slot 6 or 7, replace the card by holding the top corners and firmly pressing it into expansion slot 6 or 7. Attach any cables removed in Step 4.

NOTE

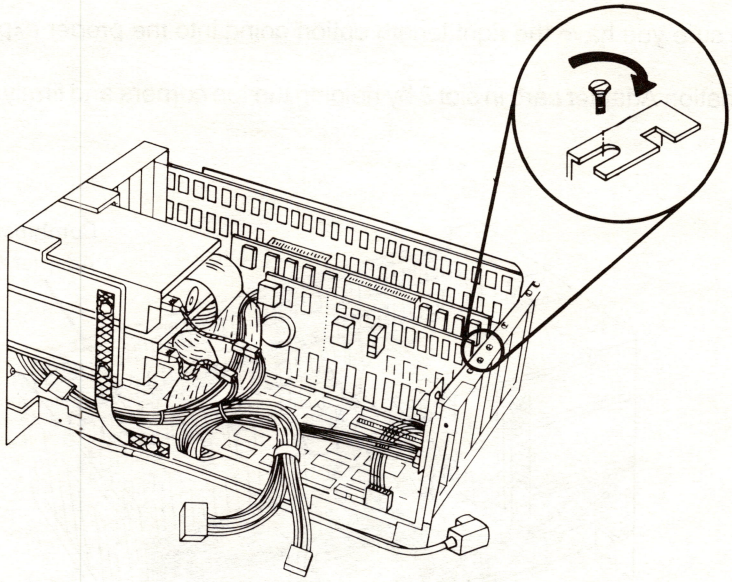
Make sure you have the right length option going into the proper expansion slot.

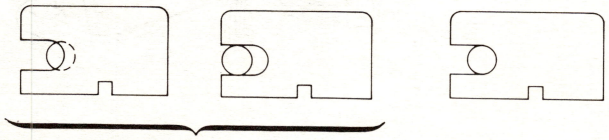
32. Install the Combination Adapter card in slot 8 by holding the top corners and firmly pressing down until the card is in position.



33. Replace the connector removed from the front of the Combination Adapter card.

34. For each of the adapters just installed in the expansion slots, align the slots in the adapter-retaining brackets with the hole in the rear panel of the system unit. Insert the screw and tighten it with a flat-blade screwdriver.

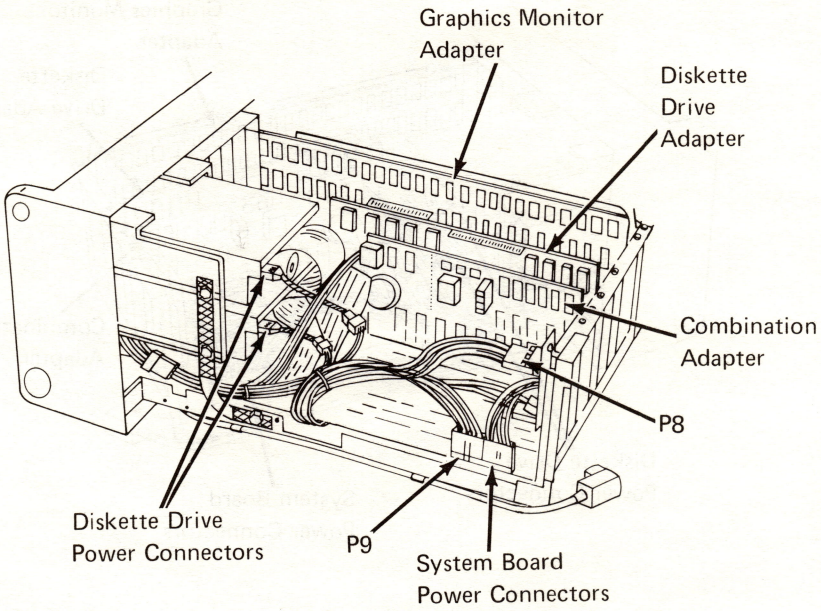




Not Aligned

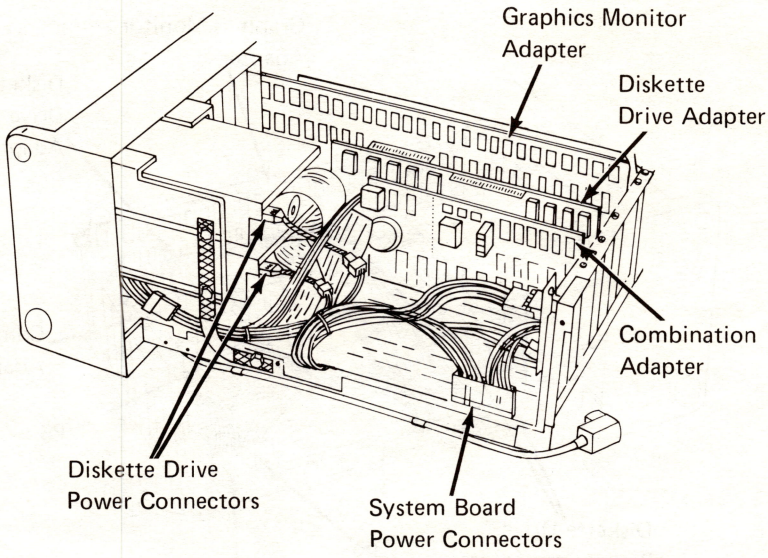
Properly Aligned

35. Connect power-supply connectors P8 and P9 to the system board and the power-cable adapter assembly. Connect the diskette drive power connectors to the diskette drives. Look at the figure below to determine where they are connected.



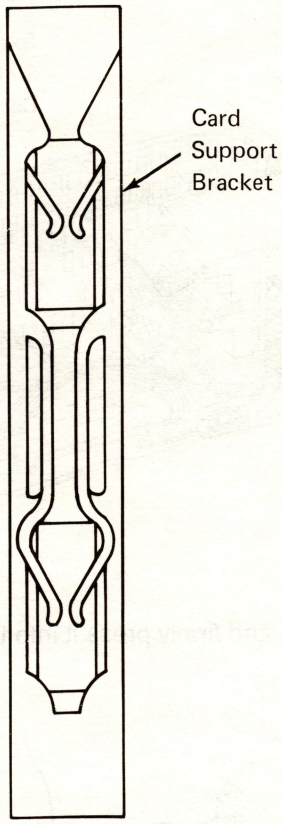
Installing Option Adapter Cards

1. Study the figure below to become familiar with the various lengths of the option cards.

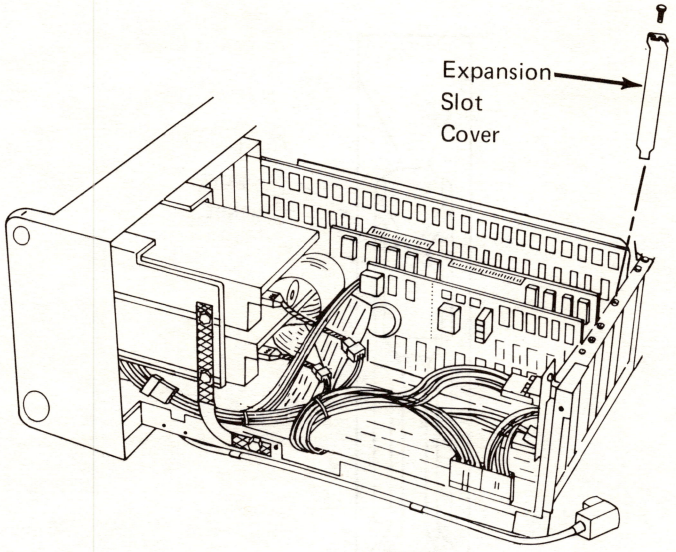


Option cards of any length will fit into expansion slots 1 through 5. Slots 6 through 8 can accommodate only short option cards. Determine by inspection the slot to be used for the option.

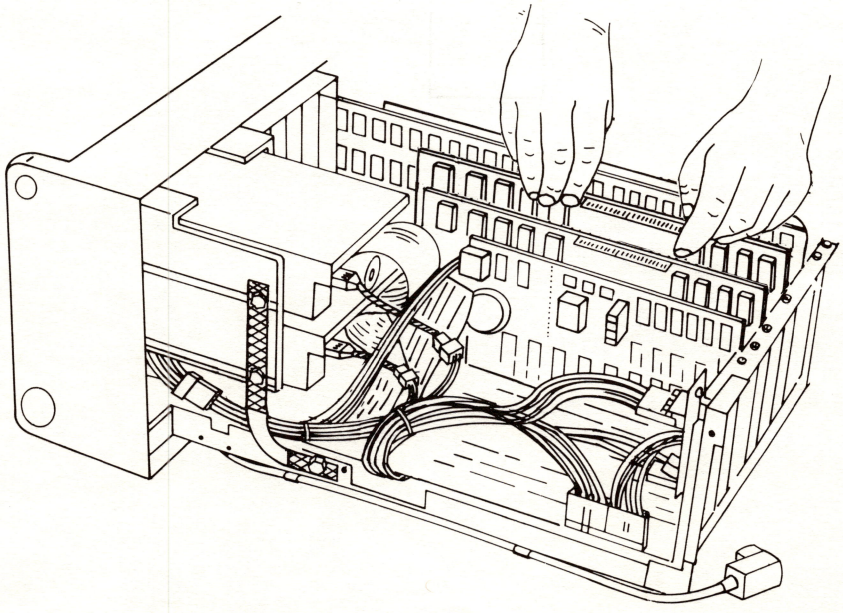
2. Some options come with instructions to install a card-support bracket in the system unit. The Workmaster has a card-support bracket already installed, so discard the bracket packaged with the option. Continue with the next step.



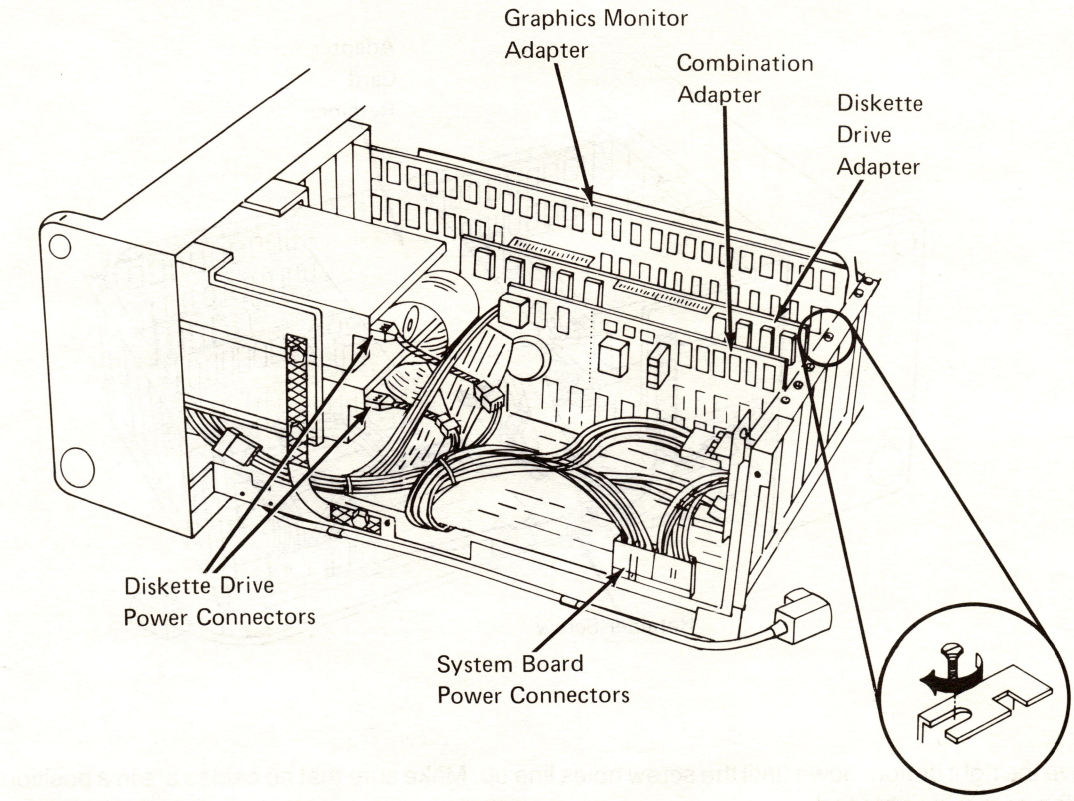
3. Place the system unit so that the rear of the unit faces you. Use a flat-blade screwdriver to remove the screw holding the expansion-slot cover in place. Remove the expansion-slot cover.

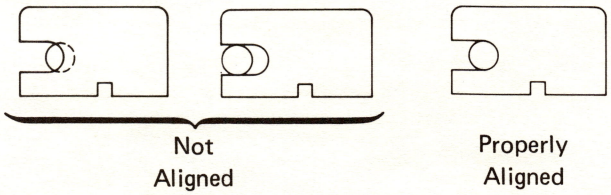


4. Hold the option card by the top corners, and firmly press it into the expansion slot.



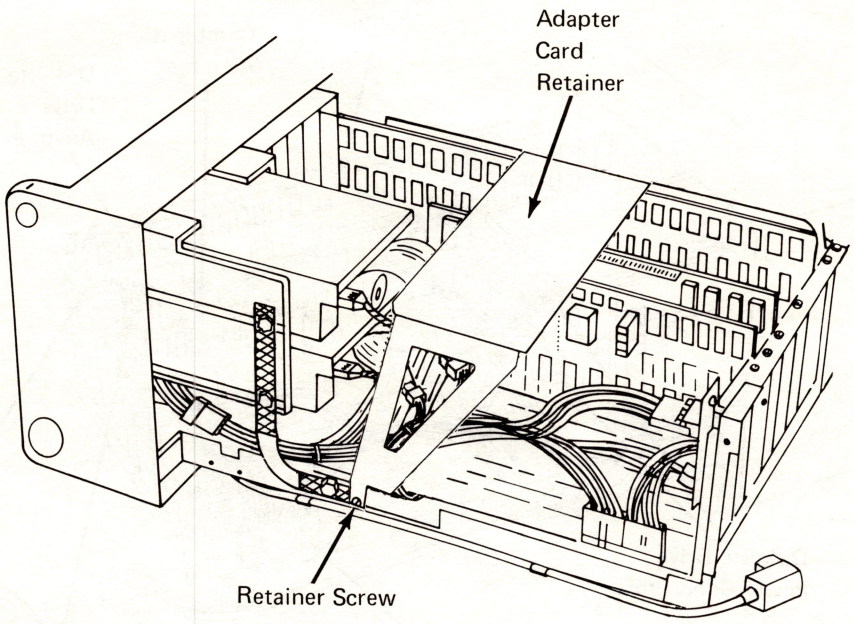
5. Align the slot of the option-retaining bracket with the threaded screw hole in the rear panel of the system unit.
6. Insert the screw and tighten it clockwise with a flat-blade screwdriver.





Replacing the Adapter Card Retainer

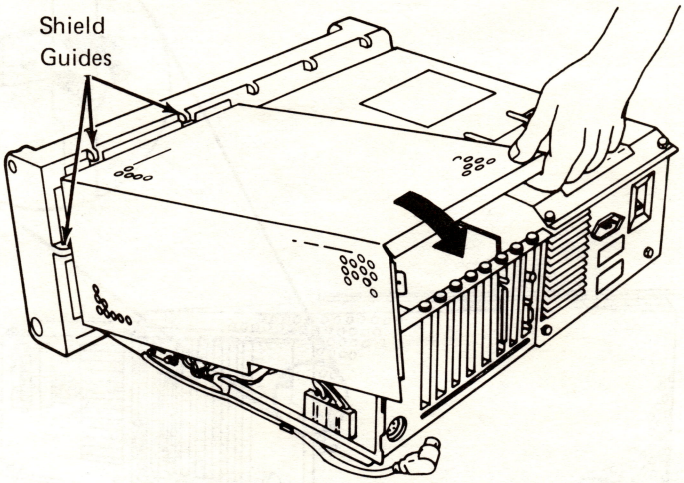
1. Replace the adapter-card retainer by carefully inserting the retainer tab between the Graphics Monitor Adapter and the center support.

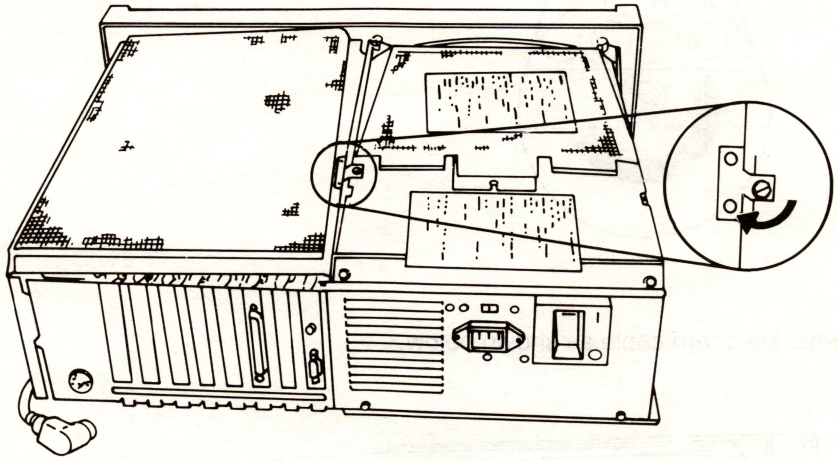


2. Move the right bottom down until the screw holes line up. Make sure that no cables are in a position to be pinched as the screw is tightened.
3. Tighten the screw.

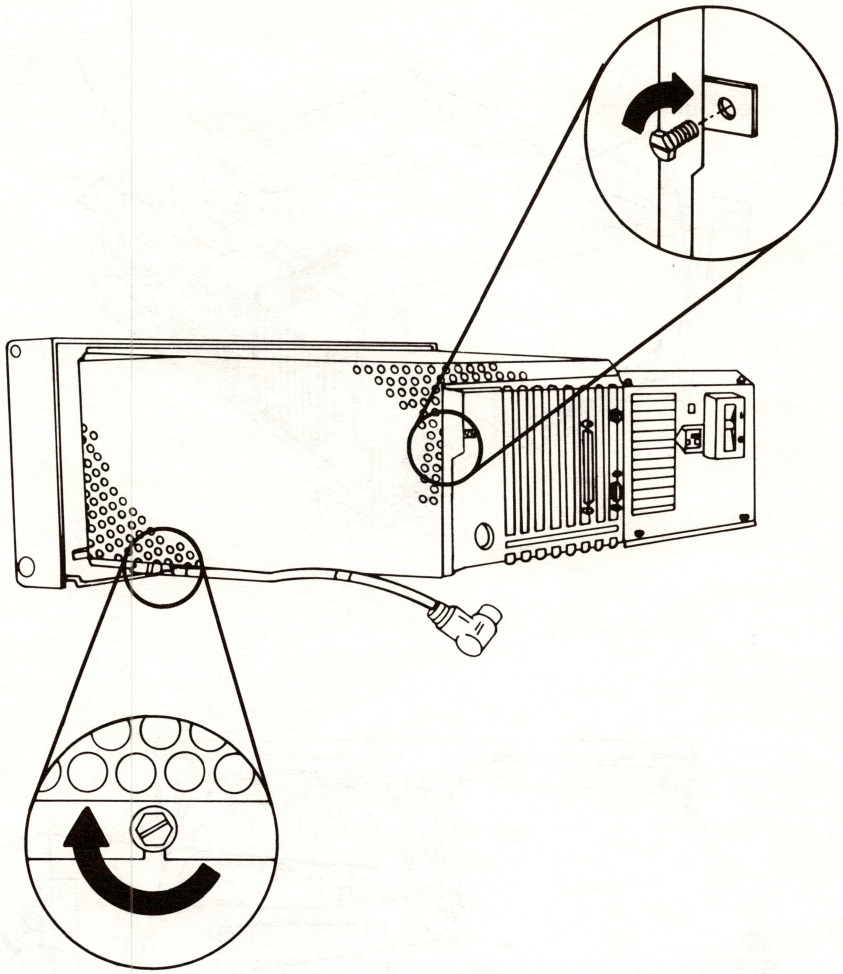
Replacing the Cover

1. Install the shield by placing the notches over the guides in the front panel. Then, lower the shield. Loosely insert the mounting screw as shown below.

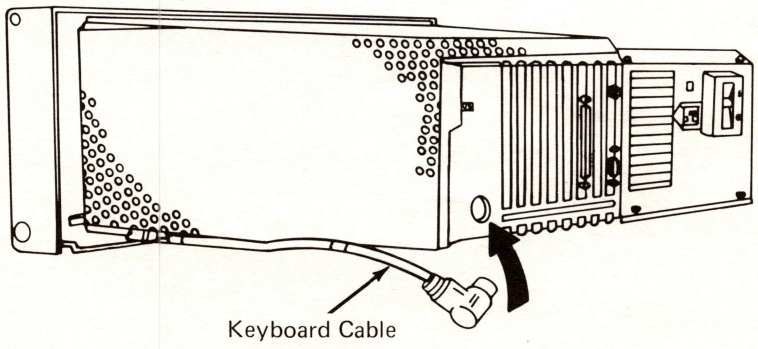




2. Place the system unit so that the right side faces you. Loosely install the two remaining shield-mounting screws. Tighten all three screws clockwise with a flat-blade screwdriver.



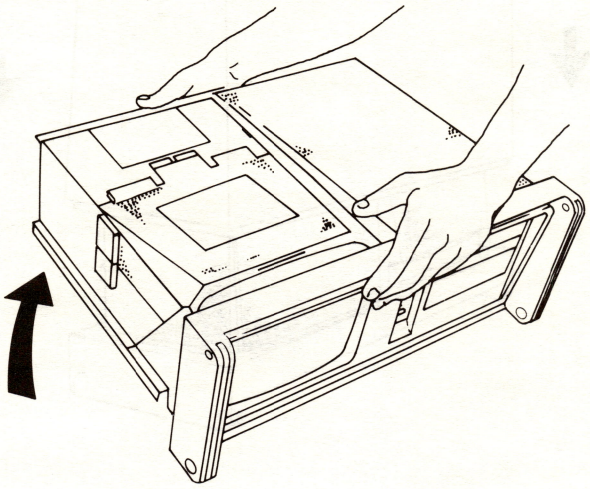
3. Connect the internal keyboard cable as shown below.

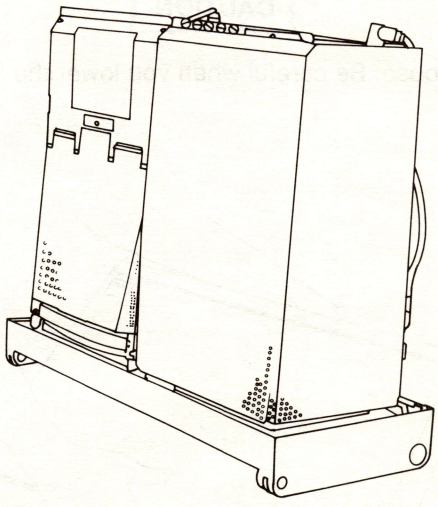


4. Place the system unit so that the front faces you. Carefully tilt the system unit up so that it rests on its front panel.

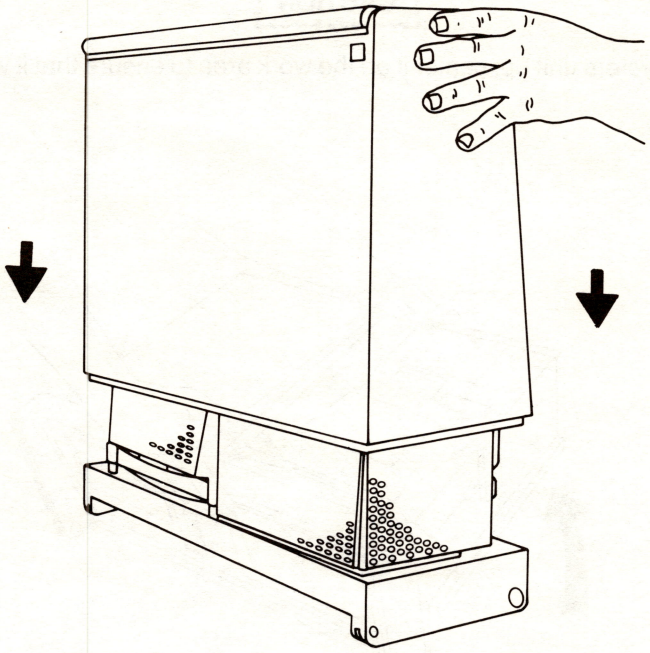
CAUTION

Before tilting the system unit up, center it on the work area to ensure that it will not fall off the table.





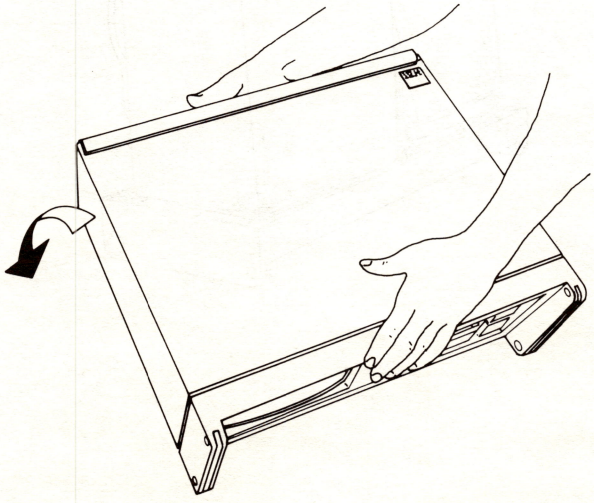
5. Slide the system-unit cover down until it fits into the front panel.



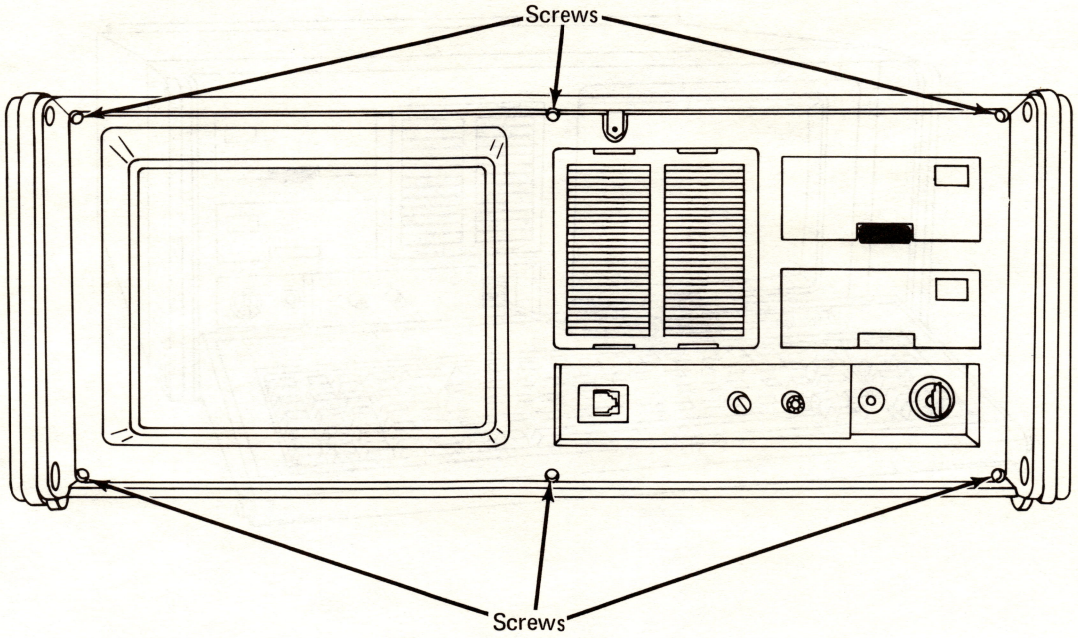
6. Carefully return the system unit to its operating position.

CAUTION

The system-unit cover is loose. Be careful when you lower the system unit to its operating position.

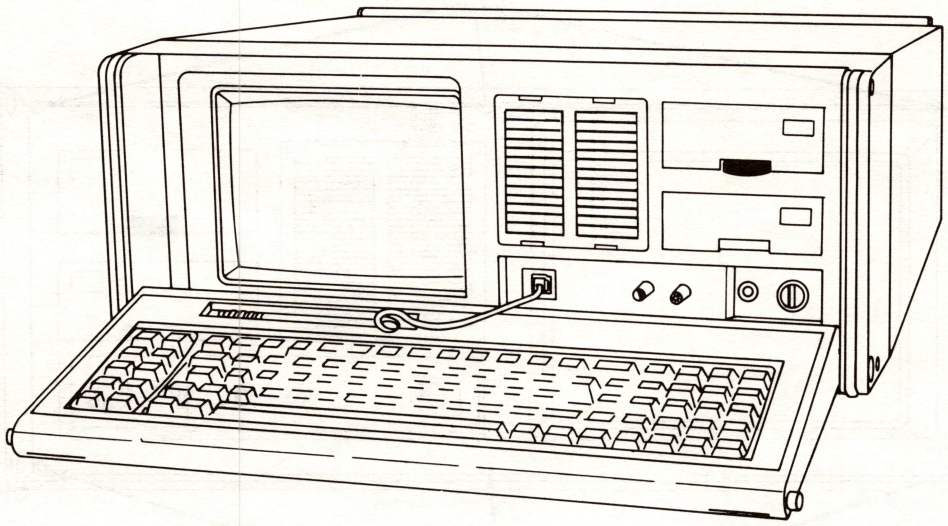


7. Insert the six mounting screws in the front panel. Tighten the screws clockwise with a 3-mm allen wrench.

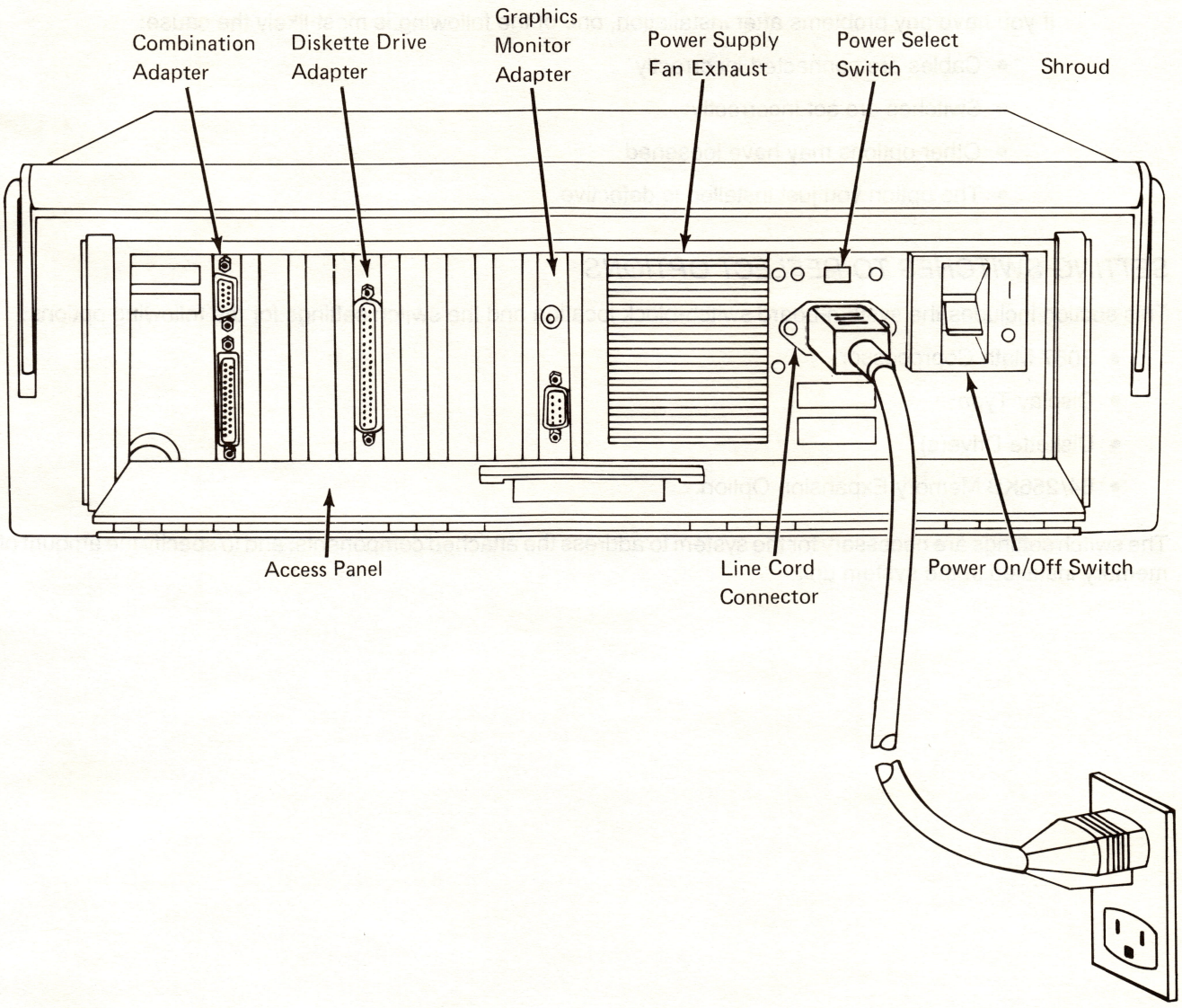


Preparing the System for the Power-On Self-Test

1. Connect the keyboard cable to the system unit.



2. Connect all cables and the power cord to the rear of the system unit.
3. Plug the system unit's power cord into the wall outlet.



4. Your system unit is now ready for the power-on self-test. Read Chapter 2, "Installation," for a description of this test.

NOTE

If you have any problems after installation, one of the following is most likely the cause:

- Cables are connected incorrectly
- Switches are set incorrectly
- Other options may have loosened
- The option you just installed is defective.

SETTING SWITCHES TO REFLECT OPTIONS

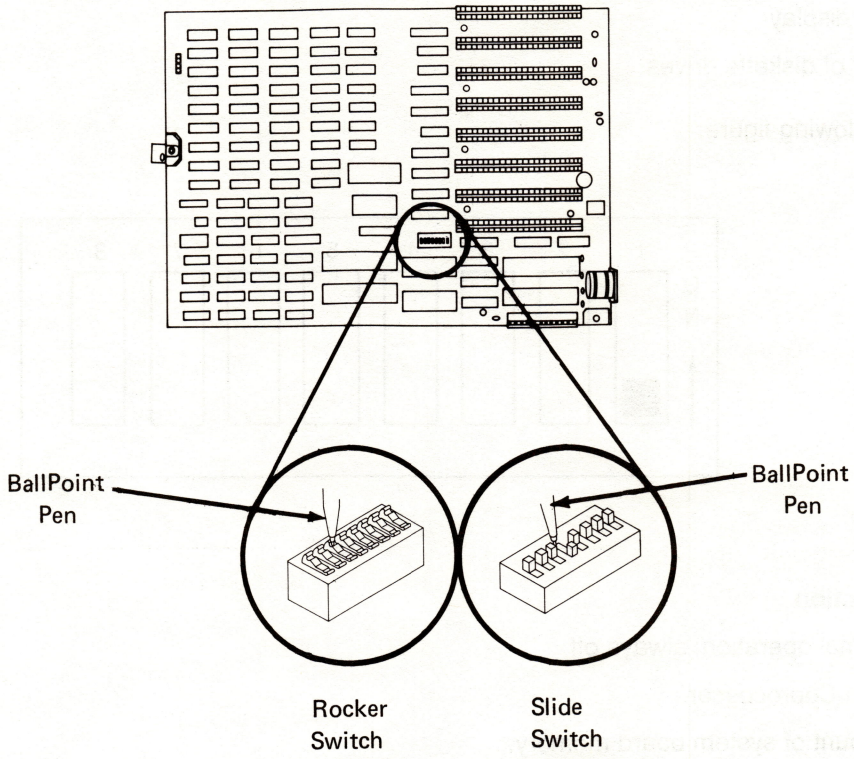
This section includes the system-board switch-block location and the switch settings for the following options:

- 8087 Math Coprocessor
- Display Type
- Diskette Drive(s)
- 64/256KB Memory Expansion Option.

The switch settings are necessary for the system to address the attached components, and to specify the amount of memory installed in the system unit.

LOCATING THE SYSTEM-BOARD SWITCH BLOCK

The following figure shows the switch-block location on the system board. For switch settings, refer to "Setting the Switches."

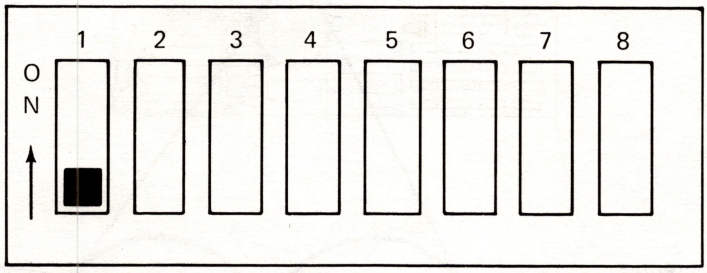


SETTING THE SWITCHES

The positions of these eight switches indicate the following:

- Presence of the math coprocessor
- Amount of memory
- Type of display
- Number of diskette drives.

Refer to the following figure:



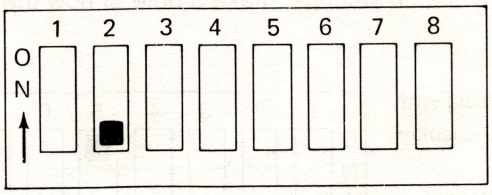
Switch	Function
1	Normal operation; always off.
2	Math Coprocessor.
3-4	Amount of system board memory.
5-6	Type of display you are using.
7-8	Number of diskette drives installed.

Math Coprocessor. The following figure shows the setting for Switch 2.

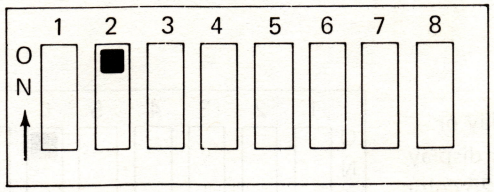
WARNING

Before you change any switch settings, make a note of how the switches are presently set

With Coprocessor



Without Coprocessor



Display Type. The following figure shows the settings for Switches 5 and 6.

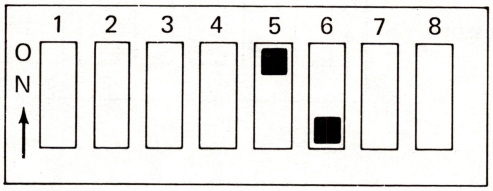
NOTE

The switch settings do not have to be adjusted for the Color Display.

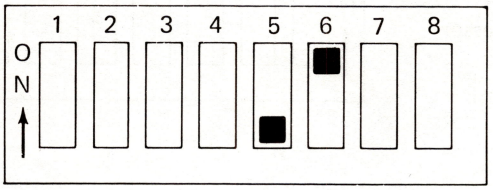
WARNING

Before you change any switch settings, make a note of how the switches are presently set.

Normal Setting with no External Display or Color Display or other color display in the 80X25 color mode



Color Display or other color display in the 40X25 color mode



NOTE

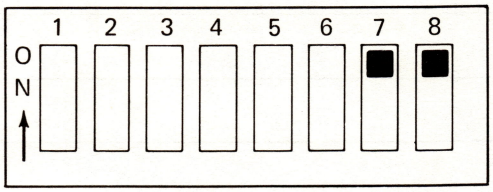
The 40x25 mode means 40 characters across the screen and 25 lines down the screen. The 40x25 mode is normally used with a home television. The 80x25 mode means 80 characters across the screen and 25 lines down the screen. This mode, when used with home televisions and various displays, can cause loss of character quality.

Diskette Drive(s). The following figure shows the settings for Switches 7 and 8.

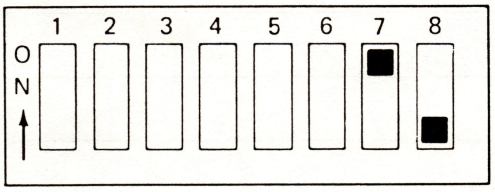
WARNING

Before you change any switch settings, make a note of how the switches are presently set.

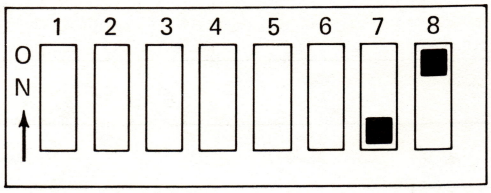
1 Drive



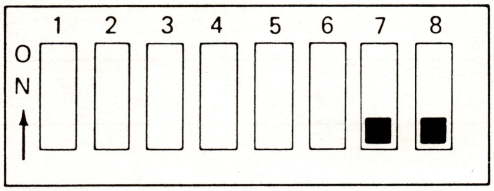
3 Drives



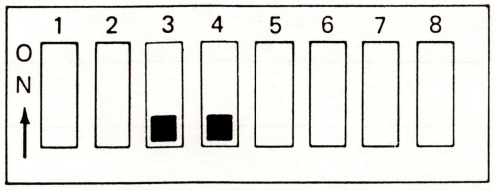
2 Drives



4 Drives



Memory. The switch setting shown below indicates the current setting for all Workmasters co-figured from 256K to 640 K.



NOTES

CHAPTER 5
RELOCATION

This chapter tells you how to move the Workmaster™. The chapter discusses:

- Preparing the system unit
- Moving the system unit
- Installing Workmaster at the new location.

WARNING

The installation procedures require you to switch off the Workmaster and disconnect it from all external devices. Be aware of the equipment that depends on the Workmaster before disconnecting external devices. Take necessary precautions before switching off power.

Follow the directions carefully to ensure a successful relocation of the Workmaster.

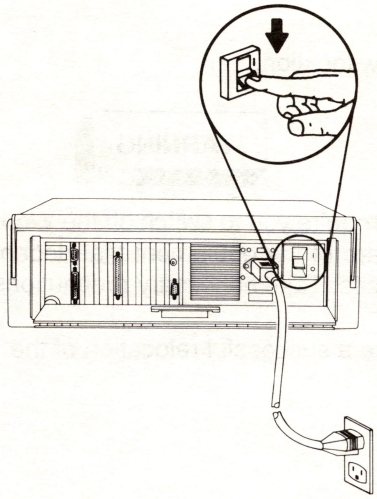
™ Trademark of General Electric Company.

PREPARING THE SYSTEM UNIT

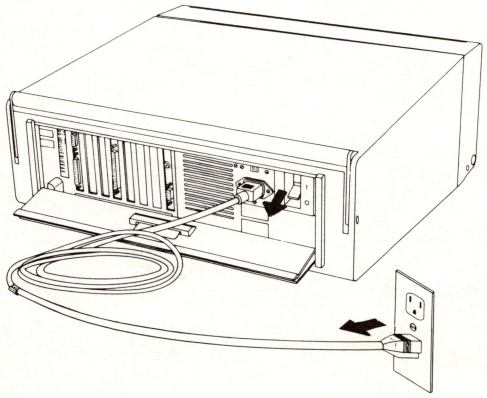
1. Switch off the power on the system unit.

WARNING

The installation procedures require you to switch off the Workmaster and disconnect it from all external devices. Be aware of the equipment that depends on the Workmaster before disconnecting external devices. Take necessary precautions before switching off power.

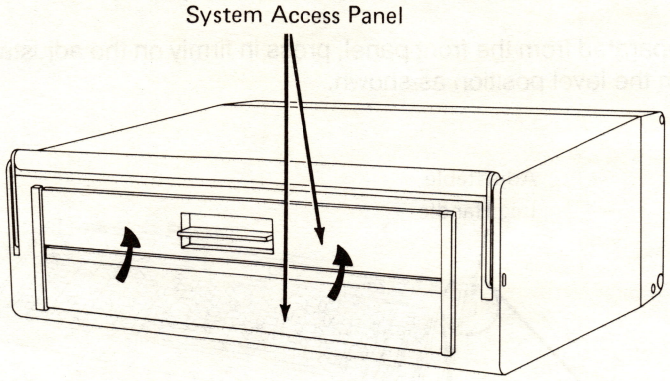


2. Unplug the system unit's power cord from the wall outlet. Disconnect all cables and the power cord from the rear of the system unit.



3. Coil the system unit's power cord and place it in the power-cord storage pocket on the carrying case if you have one. Otherwise, coil the cord and store it between the display and the closed keyboard.

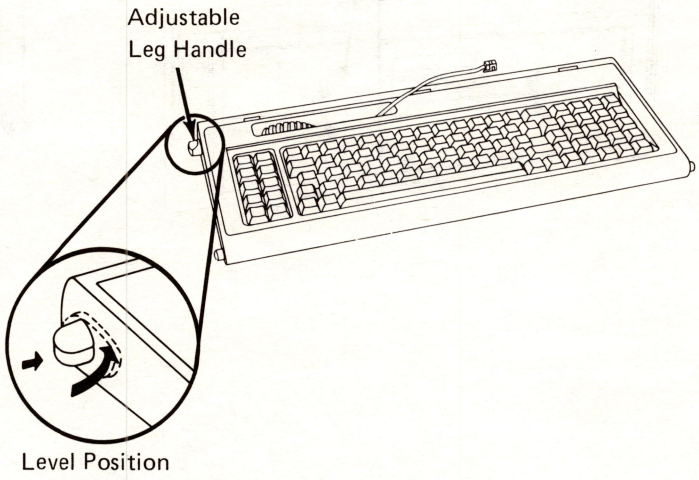
4. Close the system access panel by raising the hinged panel.



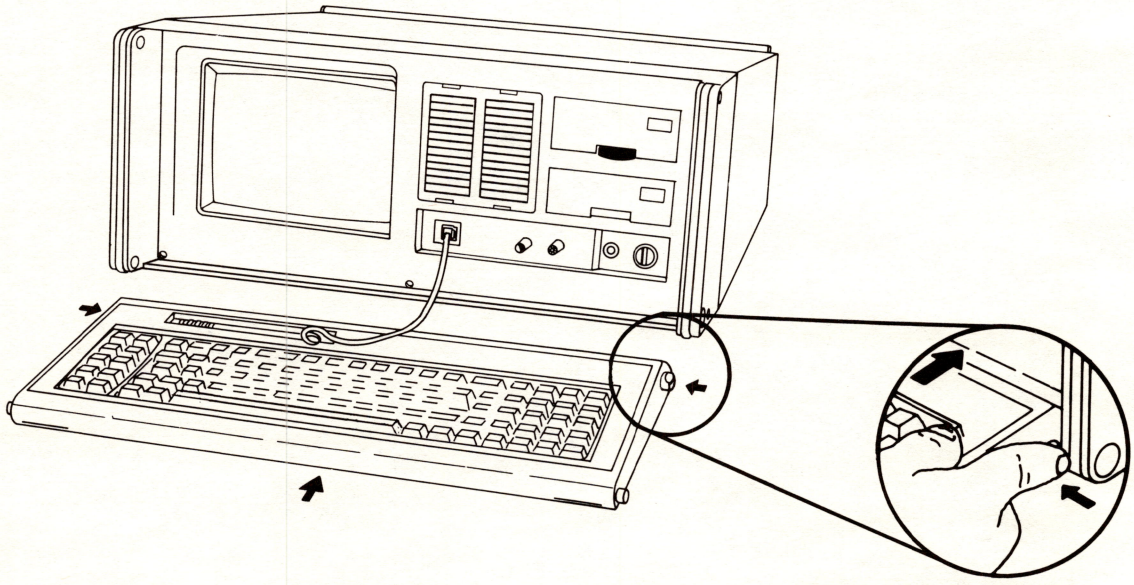
WARNING

Remove diskettes before storing or transporting the Workmaster.

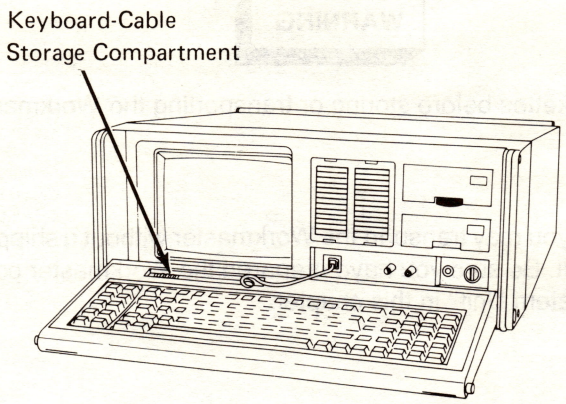
5. If the keyboard is separated from the front panel, press in firmly on the adjustable leg handles of the keyboard and place the legs in the level position as shown.



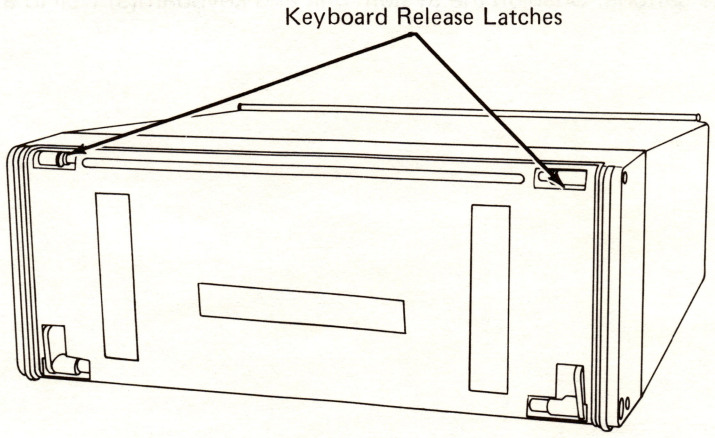
6. Press the adjustable leg handles in again and slide them into the bottom holes on the front panel.



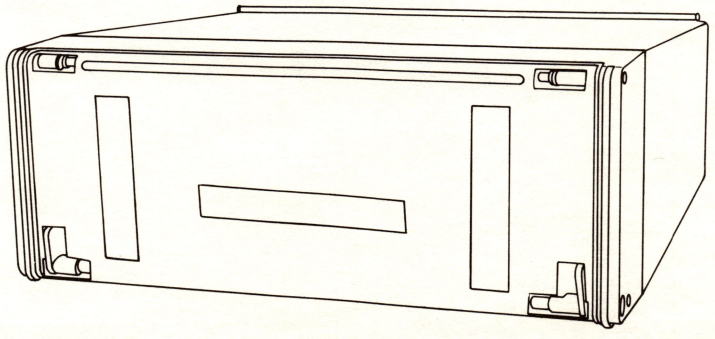
7. If the keyboard cable is extended, store the coiled portion of the cable in the keyboard-cable storage compartment.



8. Pivot the keyboard up. Press the two keyboard release latches toward the center of the system while pushing the keyboard against the front panel. Release the latches.



The system unit is now ready to be moved.



Moving the System Unit

When you are moving the Workmaster, you must consider the distance of the move.

WARNING

Remove diskettes before storing or transporting the Workmaster.

SHORT DISTANCE MOVE

If you are traveling a short distance, you may transport the Workmaster without a shipping carton. Use the carrying handle on the rear of the system unit. Be sure you have prepared the Workmaster correctly before attempting to move it. Refer to "Preparing the System Unit" in this chapter.

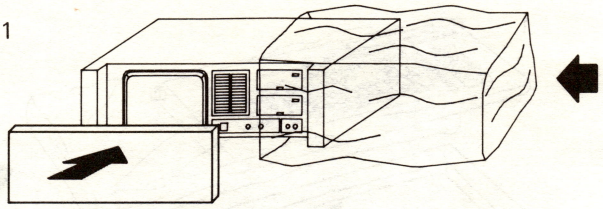
LONG DISTANCE MOVE

If you are shipping the Workmaster over a long distance, or if you do not have control over its treatment, you may wish to protect it by placing it in a carton.

If you saved the original shipping cartons and packing material, pack the system unit and keyboard in them. If you do not have the original packing material, make sure you use sturdy cartons. Remember to pack the system unit and the keyboard in separate cartons. Cushion the system unit and keyboard(s) well to avoid damage.

PACKING THE SYSTEM UNIT

1



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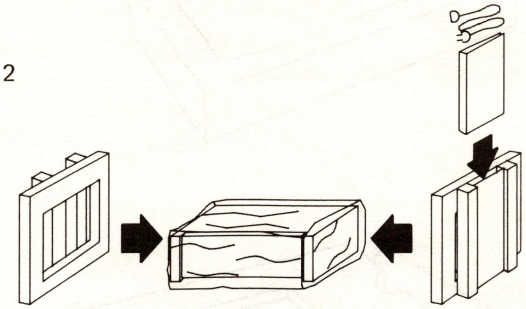

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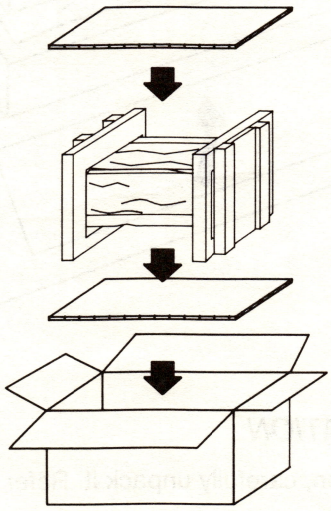
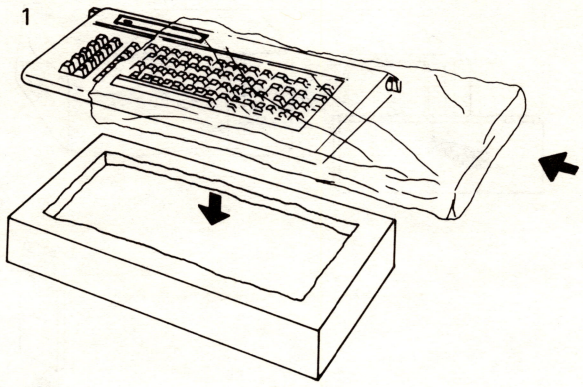


NOTE

Place the books in the box with the system unit.

PACKING THE KEYBOARD

1



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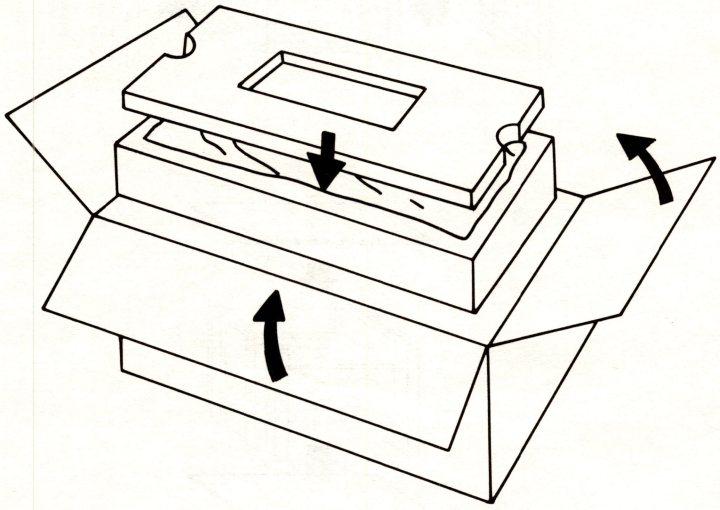

INSTALLATION AT THE NEW LOCATION

When the system arrives at the new location, carefully unpack it. Refer to Chapter 2 of this manual to install the Workmaster at the new location.

GLOSSARY

adapter. Sometimes called a "module" or "wrap plug" which is used in the diagnostics testing to "wrap" certain signals back to others to allow for a more thorough test device.

ASCII. American National Standard Code for Information Interchange. The standard code using a coded character set consisting of 7-bit coded characters (8 bits including parity check). The ASCII set consists of control characters and graphic characters.

BASIC. (Beginner's All-purpose Symbolic Instruction Code.) A program language that uses common English words.

cursor. A movable spot of light on the screen of a display, usually indicating where the next character is to be entered, replaced, or deleted.

data. All information entered into or used by the computer.

diagnostic. Pertaining to the detection and isolation of a malfunction or mistake.

Diagnostics diskette. A diskette used by computer users and service personnel to diagnose hardware problems.

diskette. A thin flexible, magnetic disk and a protective jacket, in which the disk is permanently enclosed.

diskette drive. A device that uses diskettes for storage and retrieval of data.

fixed disk. A disk of rigid material with a magnetic coating, used for mass storage and retrieval of data.

formatting. The preparation of a disk or diskette for use by the computer.

formatted disk/diskette. A disk/diskette that can be used by the computer for the storage of data.

graphic character. A character, other than a control character, that is normally represented by a symbol.

KB. Kilobyte. A kilobyte equals 1024 bytes of information.

MB. Megabyte. A megabyte equals 1,048,576 bytes of information.

modem. A device that allows computers to exchange information over telephone lines.

operating system. A program that supervises the execution of user programs by the computer.

power-on self-test. A series of diagnostics tests that are executed each time the Power switch on the Workmaster is set to On.

system unit. That portion of the Workmaster which houses all electronics, disk drives, power supply and CRT. The system unit does not include the keyboard which is a separate diagnosable replaceable part.

typematic keys. Keyboard buttons that repeat their function when held down.

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PRODUCT DATA SHEET FOR WORKMASTER™ SERIES SIX TERMINATOR BOARD

GENERAL DESCRIPTION

The WORKMASTER/Series Six Terminator board (IC640BLD304A) is one board of a two board set. The set provides parallel communications between a WORKMASTER™ industrial personal computer and a Series Six programmable controller. This board contains all the circuitry necessary to terminate and protect data lines between a WORKMASTER and a Series Six Programmable Controller. The other board in the two board set (the Workmaster/Series Six Interface board) contains the microprocessor circuitry for controlling data transfer between a Series Six CPU and a WORKMASTER computer. The two boards are connected by a 34 wire ribbon cable.

FEATURES and BENEFITS

- This TERMINATOR board contains no integrated circuit components

- This TERMINATOR board contains setup controls consisting of two 8 position DIP rocker switches. When all 16 DIP rocker switches are in the ON position, the parallel data bus from the WORKMASTER to the Series Six controller is properly terminated for long distance communication. When these switches are OFF the Terminator board proavides no termination.

- When installed in the WORKMASTER computer the hardware of the workmaster unit is protected from surge damage caused by incorrect AC wiring of the WORKMASTER and Series Six controller. This is accomplished by fusing every line in the parallel bus with a 0.125 amp picofuse located on the Terminator board. This protection is always in effect, no matter the position of any of the DIP switches on the Terminator board.

SPECIFICATIONS

o	Space Requirement:	One short board slot in the WORKMASTER.
o	Power Requirement:	NONE: supplied by the WORKMASTER/Series Six Interface.
o	Storage Temperature:	-40° to +80° C.
o	Operating Temperature:	0° to 70° C.
o	Humidity:	5% to 95% (non-condensing).
o	Altitude:	Up to 6,600 feet (2,000 meters) above sea level operating.
o	Noise and transient immunity:	Not affected by: Showering arcs per NEMA ICS 2,230.40
o	Dimensions:	4.20 x 7.0 x 0.45 inches 107 x 178 x 12 MM
o	Dressplate:	Dressplate with cutout for 37 pin 'D' connector.

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INSTALLATION

In the "Guide To Operation" manual (GEK-25373) in the workmaster computer there are very detailed instructions for installing option boards in the WORKMASTER. References will be made in this more general installation section to pages in the "Guide To Operation" manual for specific instructions.

References will be made to page 4-13 thru 4--23 and pages 4-54 thru 4-63 of the "Guide To Operation" manual (GEK-25373).

- Follow the instructions on pages 4-13 thru 4-16 for preparing the unit and removing the cover. Then follow the instructions on pages 4-17 thru 4-19 of GEK-25373 for removing the six front panel screws holding the bezel assembly and sliding the front panel assembly and inner chassis out of the case.

- Pages 4-20 thru 4-23 of GEK-25373 should be followed for removing the adapter card retainer and the metal shield protecting the expansion board area.

- Refer to pages 4-54 thru 4-57 of GEK-25373 when installing the Terminator option board. Insert the Terminator board into the short slot adjacent to the Disk Controller Adapter board. If an Interface board is to be installed at this time, follow the instructions included with the Interface board (GEK-90765), it should be inserted into the long slot next to the Disk Controller Adapter board.

- Plug the 34 pin ribbon cable connector from the Terminator board into the 34 pin connector on the top of the Interface board.

- Pages 4-58 thru 4-63 of GEK-25373 show the instructions for replacing the Adapter Card Retainer, the metal shield, and the WORKMASTER cover.

- Follow the Power-On-Self-Test starting on page 4-64 to verify a proper installation of the option boards

ORDERING INFORMATION

CIRCUIT BOARD	CATALOG NUMBER
TERMINATOR BOARD FOR WORKMASTER COMPUTER	IC640BLD304A

For further information, contact your local GE sales office

PRODUCT DATA SHEET FOR WORKMASTER™ SERIES SIX INTERFACE BOARD

GENERAL DESCRIPTION

The WORKMASTER/Series Six Interface board (IC640BSS303A) is one board of a two board set. The set provides parallel communications between a WORKMASTER™ industrial computer and a Series Six programmable controller. This board contains all the circuitry necessary to format and transfer data between a WORKMASTER and a Series Six CPU. The other board in the two board set (the WORKMASTER Series Six Terminator board) provides termination resistors and surge protection for the two board set and the WORKMASTER. The two boards are connected by a 34 wire ribbon cable.

FEATURES and BENEFITS

- This INTERFACE board has no PROM or other non-volatile memory functions. The executive program is loaded into the on-board RAM memory. Future software improvements and revisions will not require any hardware changes on the board.
- This INTERFACE board contains no operator controls, jumpers, etc. All interfaces to the board occur through software.
- When installed in the WORKMASTER computer, in conjunction with the TERMINATOR board, the system is protected from surge damage caused by incorrect AC wiring of the WORKMASTER and the Series Six controller.

SPECIFICATIONS

o	Space Requirement:	One full length board slot in the WORKMASTER.
o	Power Requirement:	+5VDC supplied by the WORKMASTER.
o	Storage Temperature:	-40° to +80° C.
o	Operating Temperature:	0° to 70° C.
o	Humidity:	5% to 95% (non-condensing).
o	Altitude:	Up to 6,600 feet (2,000 meters) above sea level operating.
o	Noise and transient immunity:	Not affected by: Showering arcs per NEMA ICS 2,230.40
	Dimensions:	4.20 x 13.40 x o.45 inches 107 x 340 x 12 MM
o	Dressplate:	none.

™ TRADEMARK OF GENERAL ELECTRIC COMPANY

INSTALLATION

In the "Guide To Operation" manual (GEK-25373) for WORKMASTER there are very detailed instructions for installing option boards in the WORKMASTER. References will be made in this more general installation section to pages in the "Guide To Operation" manual for specific instructions.

References will be made to page 4-13 thru 4--23 and pages 4-54 thru 4-63 of the "Guide To Operation" manual (GEK-25373).

- Follow the instructions on pages 4-13 thru 4-16 for prepairing the unit and removing the cover. Then follow the instructions on pages 4-17 thru 4-19 of GEK-25373 for removing the six front panel screws holding the bezel assembly and sliding the front panel assembly and inner chassis out of the case.

- Pages 4-20 thru 4-23 of GEK-25373 should be followed for removing the adapter card retainer and the metal shield protecting the expansion board area.

- Refer to pages 4-54 thru 4-57 of GEK-25373 when installing the Interface option board. Insert the Interface board into the slot adjacent to the Disk Controller Adapter board. If a Terminator board is to be installed at this time, follow the instructions included with the terminator board (GEK-90764), it should be inserted into the short slot next to the Disk Controller Adapter board.

- Plug the 34 pin ribbon cable connector from the Terminator board into the 34 pin connector on the top of the interface board.

- Pages 4-58 thru 4-63 of GEK-25373 show the instructions for replacing the Adapter Card Retainer, the metal shield, and the WORKMASTER cover.

- Follow the Power-On-Self-Test starting on page 4-64 to verify a proper installation of the option boards

ORDERING INFORMATION

CIRCUIT BOARD	CATALOG NUMBER
INTERFACE BOARD FOR WORKMASTER COMPUTER	IC640BSS303A

For further information, contact your local GE sales office

PRODUCT DATA SHEET
FOR
WORKMASTER tm
384K MEMORY EXPANDER BOARD

GENERAL DESCRIPTION

This memory board is used to expand the Random Access Memory (RAM) of the WORKMASTER System Unit. This board contains RAM chips for 384K (1K=1024) bytes, with 8 data bits and one parity bit per byte. When installed in the system unit, this board will increase WORKMASTER'S memory from 256K bytes (contained on the system board) to 640K bytes.
This memory board is required for all GE-FURNISHED software. It permits the retention of most programs entirely in RAM memory, rendering unnecessary the need for repeatedly reading the programs from disk. The resulting improvement in response time is a major advantage in real-time industrial applications.

FEATURES:	BENEFITS:
o INCREASES RAM MEMORY TO 640K BYTES	o CAN HANDLE BIGGER PROGRAMS WITH FASTER RESPONSE.
o PARITY CHECKED	o BETTER SECURITY & RELIABILITY.
o FITS INTO SHORT SLOT	o LEAVES MORE ROOM FOR OTHER OPTIONS.

INSTALLATION

DIP switches, on this module, are preset in the factory to enable parity checking and for starting addresses of 4000:0 hexidecimal (equivalent to 256K). Check switch settings as shown in Table 1.
The board is normally installed in slot 7 (the second short slot from the diskette end).
For specific installation instructions refer to GEK-25373 (GUIDE TO OPERATION). INSTALLING OPTIONS: Pages 4-13 through 4-23 and INSTALLING OPTION ADAPTER CARDS: Pages 4-54 through 4-66.

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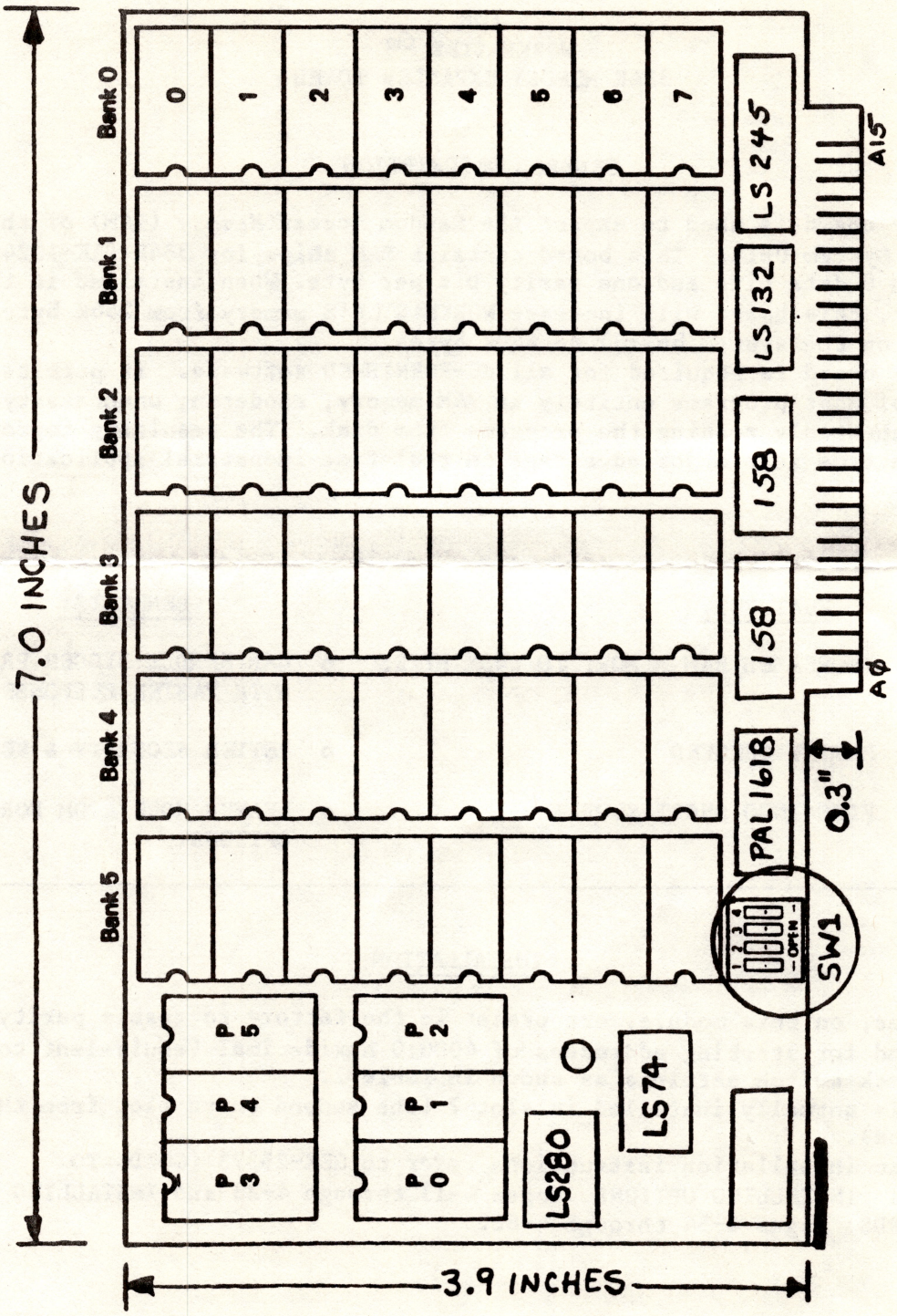
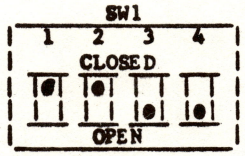
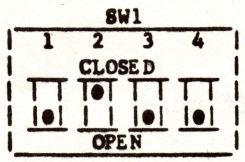
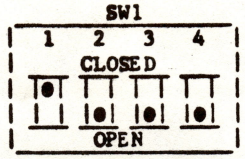
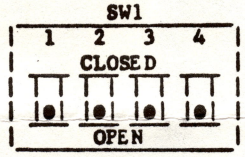
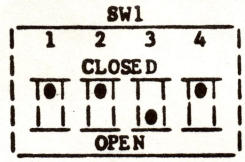
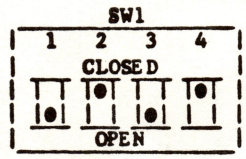
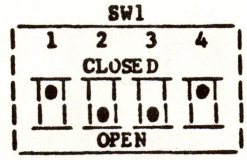
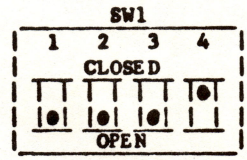


FIGURE 1
WORKMASTER 384K MEMORY EXPANSION BOARD

INSTALLATION CONTINUED

SW1 positions 1 and 2 select the starting address of the 384K of RAM memory contained on this board.
SW1 position 3 has no function and may be in any position.
SW1 position 4 selects if PARITY checking is used.

SW1 DIP SWITCH SETTING	STARTING ADDRESS OF MEMORY
	SEGMENT 2000 HEX (128K) DISABLES PARITY CHECKING
	SEGMENT 3000 HEX (192K) DISABLES PARITY CHECKING
	SEGMENT 4000 HEX (256K) DISABLES PARITY CHECKING
	SEGMENT A000 HEX (640K) * DISABLES PARITY CHECKING
	SEGMENT 2000 HEX (128K) ENABLES PARITY CHECKING
	SEGMENT 3000 HEX (192K) ENABLES PARITY CHECKING
	SEGMENT 4000 HEX (256K) ENABLES PARITY CHECKING
	SEGMENT A000 HEX (640K) * ENABLES PARITY CHECKING

*= THIS USES ONLY THE 64K OF RAM IN BANK 0 OF THIS BOARD AND BANK 1 PARITY. THE REST OF THE MEMORY IN THIS BOARD IS UNUSED.

TABLE 1
USE OF SW1 SETUP SWITCHES FOR SYSTEM STARTING ADDRESS SELECTION OF THE RAM MEMORY CONTAINED ON THIS BOARD

ORDERING INFORMATIOIN

CIRCUIT BOARD	CATALOG NUMBER
384K RAM MEMORY BOARD	IC640BRM301A

For further information, contact your local GE sales office

PROGRAMMABLE CONTROL DEPARTMENT, GENERAL ELECTRIC COMPANY, CHARLOTTESVILLE, VA.
SEPTEMBER 1984